Appendix D
Environmental

Memorandum

Date:	July 29, 2011
To:	Matt Davis, U.S. Army Corps of Engineers
Cc:	Chris Elliott, ICF International, Jennifer Rogers, ICF International
From:	Ingrid Norgaard, ICF International
Subject:	**Public Scoping Meeting Summary for the Sutter Basin Project and Feather River West Levee Project Environmental Scoping Meetings—June 27 and 28, 2011**

Introduction

Two efforts are presently underway to study flood risk reduction improvements in Sutter and Butte Counties, one known as the Sutter Basin Feasibility Study, sponsored by the U.S. Army Corps of Engineers (USACE) to determine federal interest in flood risk reduction project(s), and one known as the Feather River West Levee Project (FRWLP), sponsored by the Sutter Butte Flood Control Agency (SBFCA) as a locally driven flood risk reduction project.

The two projects are being studied in close coordination because they at least partially overlap in their study areas, purpose, potential improvements, potential effects, and involved parties. Therefore, a joint scoping process is being conducted for the two projects to explain the relationship between the two efforts and obtain public input in a manner that is convenient, efficient, and integrated. It is anticipated that the two planning efforts will result in a separate Environmental Impact Study/Environmental Impact Report (EIS/EIR) for each project, in accordance with the National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA).

Sutter Basin Feasibility Study

USACE initiated the Sutter Basin project in 2001 and is conducting a feasibility study to evaluate flood damage reduction, ecosystem restoration, and recreation opportunities within the study area. The Central Valley Flood Protection Board (CVFPB) and SBFCA, in their roles as non-federal local sponsors, are coordinating with USACE on the feasibility study. USACE, acting as the federal lead agency under NEPA, and SBFCA, acting as the state lead agency under CEQA, have determined that an EIS/EIR will be prepared to describe alternatives, potential environmental effects, and mitigation measures.

FRWLP

SBFCA is planning the FRWLP to address levee deficiencies in the west levee of the Feather River from Thermalito Afterbay to the Sutter Bypass confluence to meet federal, state, and local flood protection criteria and goals. In 2010, an assessment district was enacted to provide local funding toward flood management improvements. These funds will be matched with those from the Disaster Preparedness and Flood Prevention Bond Act of 2006 (Proposition 1E) administered by the California Department of Water Resources (DWR). The purpose of the FRWLP would be to construct improvements as quickly as possible in advance of and compatible with the Sutter Basin Feasibility Study. USACE, acting as the federal lead agency under NEPA, and SBFCA, acting as the state lead agency under the CEQA, have determined that an EIS/EIR will be prepared to describe alternatives, potential environmental effects, and mitigation measures.

Development of the draft EIS/EIR to evaluate the FRWLP is underway and scheduled for public release in early 2012. A public release date for the Sutter Basin Project draft EIS/EIR has yet to be determined.

SBFCA and USACE have been carrying out scoping activities to assist them in determining the scope, and content of the environmental information for these two projects. SBFCA and USACE have had ongoing inter-agency consultation with responsible and interested agencies such as the Central Valley Flood Protection Board, Department of Fish and Game, Department of Water Resources (DWR), and California Regional Water Quality Control Board to name a few. In addition, SBFCA and USACE conducted a total of four public scoping meetings for the public and for federal and state agency staff on June 27th and June 28th, 2011. The following summarizes the outreach conducted to inform responsible and interested agencies and the public of the proposed projects, the scoping meetings, and the public comment received.

Noticing

Notice of Intent/Preparation

In compliance with the requirements set forth in CEQA, SBFCA and USACE prepared a Notice of Preparation (NOP). The NOP contained a brief description of the proposed project, project date, probable environmental effects, the date, time and place of the public scoping meetings, and contact information. The NOP solicited participation in determining the scopes and content of the environmental information of the EIS/EIRs. On May 20, 2011 the NOP was sent to Responsible and Trustee Agencies and involved federal agencies, to the State Clearinghouse, and parties previously requesting notice in writing. The comment period on the NOP was May 20, 2011 to July 08, 2011.

In compliance with the requirements set forth in NEPA, USACE prepared a Notice of Intent (NOI) describing its intent to prepare an EIS/EIR, the proposed action, the possible alternatives, and relevant scoping meeting and contact information. The NOI was posted in the Federal Register, the United States Government's official noticing and reporting publication, on May 20, 2011. The official comment period for the NOI was May 20, 2011 to July 08, 2011.

Mailings

SBFCA utilized a previously developed mailing list of interested stakeholders to send an email notification encouraging attendance at the scoping meetings.

Notifications

Advertisements briefly introducing the lead agencies, the proposed projects and associated environmental review processes, and publicizing the scoping meetings were placed in the Appeal Democrat and the Gridley Herald newspapers. Both newspapers are intended to reach a local and regional public audience that residents routinely rely upon to keep them abreast of Sutter and Butte county issues. The advertisements were published in the Appeal Democrat on June 20 and June 27, 2011. The advertisements were published in the Gridley Herald on June 22 and June 24, 2011. A media release was also emailed out to a number media contacts within the region on June 22, 2011.

Attachment A contains copies of the following:

- Notice of Preparation
- Notice of Intent
- Email Notification
- Appeal Democrat and Gridley Herald Ledger Advertisements
- Media Release

Public Meetings

Four public scoping meetings were held to inform the public of the proposed projects and seek feedback on the range of alternatives, environmental effects, and issues of concern related to the Sutter Basin Project and the FRWLP. The four meetings were held at two different times for two days. On June 27, 2011 the meeting times were from 3:30 to 5:30 p.m. and 6:30 to 8:30 p.m., at the Yuba City Veterans Memorial Community Center. On June 28, 2011 the meeting times were from 3:30 to 5:30 p.m. and 6:30 to 8:30 p.m., at the Gridley Veterans Memorial Hall. The meeting locations were chosen as they are central to the region. The meeting times were chosen to accommodate both the work day schedules of public agency representatives and the general public, including residents and business owners.

The meetings were open-house style workshops in which attendees could read and view the information about the two projects and interact with project staff including SBFCA, USACE, DWR, HDR Engineering consultant staff, and ICF International (ICF) environmental consulting staff.

Twenty-six graphic display boards were on display for attendees to review. The boards described and illustrated the Sutter Basin Project and FRWLP history, purpose, need and objectives, study area, levee deficiencies and potential improvements, environmental considerations, the CEQA/NEPA process and project timeline and were on display for attendees to review. SBFCA, USACE, HDR and

ICF staff were stationed at display boards to interact with public attendees and provide additional detail or answer any questions.

A Power Point presentation was given to provide a brief introduction to the Sutter Basin Project and the FRWLP including objectives, schedule, environmental compliance, and related flood control work in the region.

A fact sheet, providing an overview of the Sutter Basin Project and the FRWLP including purpose and goals, maps of the corresponding study areas, an overview of the environmental compliance process and timeline, was also made available.

Comment cards were prepared so that meeting attendees could provide feedback on the projects. These cards could be filled out during the meeting and given to a project team member.

Attachment B contains copies of the following:

- Display boards
- Power Point presentation
- Fact sheet
- Comment card templates

Public Feedback

There were 36 people in total who attended the two meetings. Twelve people attended the meeting from 3:30 to 5:00 p.m. and four people attended the meeting from 6:30 to 8:00 p.m. on June 27, 2011. Fifteen people attended the meeting from 3:30 to 5:00 p.m. and five people attended the meeting from 6:30 to 8:00 p.m. on June 28, 2011.

Five comments were received from the public regarding the EIS/EIRs during the scoping period. Below is a list summarizing the comments received.

- A request was made to keep the process for the Sutter Basin Feasibility Study on schedule so the state will be able to release EIP funding for the FRWLP.
- A comment was received regarding the importance of coordinating with the Lower Feather River Corridor Management Project so not to have to duplicate efforts on environmental studies.
- A comment was received in favor of the option of putting in a levee setback in the Nelson Slough area.
- A comment was received in opposition of the project.
- A comment addressed two issues. The first comment pertains to the lack of attention to the east levee of the Sutter Bypass. The second comment suggested using a perimeter levee around Yuba City, or a J levee on the south and west side.

Attachment C contains copies of the following:

- Comments received from all interested parties (including those transcribed by court reporter)
- Attendee sign-in sheet templates

Next Steps

The comments received during the scoping period will assist in determining which issues are evaluated in detail in both the Sutter Basin Project and FRWLP EIS/EIRs. Once alternatives have been developed based on the scoping process and preexisting information, they will be analyzed, and draft EIS/EIRs will be developed. Upon the release of the draft EIR/EIS, the public will have 45 days to comment on the document. Additionally, at least one public hearing will be held so the public and agencies can learn more about both of the draft EIR/EISs, ask questions regarding the analysis, and provide comments. At these meetings, the alternatives will be presented and explained.

Development of the draft EIS/EIR to evaluate the FRWLP is underway and scheduled for public release in early 2012. A public release date for the Sutter Basin Project draft EIS/EIR has yet to be determined.

Attachment A

- Notice of Preparation
- Notice of Intent
- Email Notification
- Appeal Democrat and Gridley Herald Ledger Advertisements
- Media Release

STATE OF CALIFORNIA

GOVERNOR'S OFFICE *of* PLANNING AND RESEARCH

STATE CLEARINGHOUSE AND PLANNING UNIT

JERRY BROWN
GOVERNOR

Notice of Preparation

May 20, 2011

To: Reviewing Agencies

Re: Sutter Basin Feasibility Study and Feather River West Levee Project
SCH# 2011052062

Attached for your review and comment is the Notice of Preparation (NOP) for the Sutter Basin Feasibility Study and Feather River West Levee Project draft Environmental Impact Report (EIR).

Responsible agencies must transmit their comments on the scope and content of the NOP, focusing on specific information related to their own statutory responsibility, within 30 days of receipt of the NOP from the Lead Agency. This is a courtesy notice provided by the State Clearinghouse with a reminder for you to comment in a timely manner. We encourage other agencies to also respond to this notice and express their concerns early in the environmental review process.

Please direct your comments to:

Ingrid Norgaard
Sutter Butte Flood Control Agency
c/o ICF International
630 K Street, Suite 400
Sacramento, CA 95814

with a copy to the State Clearinghouse in the Office of Planning and Research. Please refer to the SCH number noted above in all correspondence concerning this project.

If you have any questions about the environmental document review process, please call the State Clearinghouse at (916) 445-0613.

Sincerely,

Scott Morgan
Director, State Clearinghouse

Attachments
cc: Lead Agency

Document Details Report
State Clearinghouse Data Base

SCH# 2011052062
Project Title Sutter Basin Feasibility Study and Feather River West Levee Project
Lead Agency Sutter Butte Flood Control Agency

Type NOP Notice of Preparation

Description Two efforts are presently underway to study flood risk reduction improvements in Sutter and Butte Counties, one known as the Sutter Basin Feasibility Study, sponsored by the U.S. Army Corps of Engineers (USACE) to determine federal interest in flood risk reduction project(s), and one known as the Feather River West Levee Project (FRWLP), sponsored by the Sutter Butte Flood Control Agency (SBFCA) as a locally driven flood risk reduction project.

Lead Agency Contact

Name Ingrid Norgaard
Agency Sutter Butte Flood Control Agency
Phone 916 737-3000 **Fax**
email inorgaard@icfi.com
Address c/o ICF International
630 K Street, Suite 400
City Sacramento **State** CA **Zip** 95814

Project Location

County Sutter, Butte
City
Region
Cross Streets
Lat / Long
Parcel No.
Township **Range** **Section** **Base**

Proximity to:

Highways
Airports
Railways
Waterways
Schools
Land Use

Project Issues Aesthetic/Visual; Agricultural Land; Air Quality; Biological Resources; Archaeologic-Historic; Geologic/Seismic; Toxic/Hazardous; Water Quality; Landuse; Other Issues; Minerals; Noise; Population/Housing Balance; Public Services; Recreation/Parks; Economics/Jobs; Traffic/Circulation

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Reviewing Agencies Resources Agency; Department of Conservation; Central Valley Flood Protection Board; Office of Historic Preservation; Department of Parks and Recreation; Department of Water Resources; Department of Fish and Game, Region 2; Office of Emergency Management Agency, California; Native American Heritage Commission; State Lands Commission; Caltrans, District 3; State Water Resources Control Board, Division of Water Quality; Regional Water Quality Control Bd., Region 5 (Sacramento); Regional Water Quality Control Bd., Region 5 (Redding)

Date Received 05/20/2011 **Start of Review** 05/20/2011 **End of Review** 06/20/2011

County: SCH#

ources Agency

Resources Agency
Nadell Gayou

Dept. of Boating & Waterways
Mike Sotelo

California Coastal Commission
Elizabeth A. Fuchs

Colorado River Board
Gerald R. Zimmerman

Dept. of Conservation
Rebecca Salazar

California Energy Commission
Eric Knight

Cal Fire
Allen Robertson

Central Valley Flood Protection Board
James Herota

Office of Historic Preservation
Ron Parsons

Dept of Parks & Recreation
Environmental Stewardship Section

California Department of Resources, Recycling & Recovery
Sue O'Leary

S.F. Bay Conservation & Dev't. Comm.
Steve McAdam

Dept. of Water Resources
Resources Agency
Nadell Gayou

Conservancy

and Game

Depart. of Fish & Game
Scott Flint
Environmental Services Division

Fish & Game Region 1
Donald Koch

- [ ] **Fish & Game Region 1E**
  Laurie Harnsberger
- [x] **Fish & Game Region 2**
  Jeff Drongesen
- [ ] **Fish & Game Region 3**
  Charles Armor
- [ ] **Fish & Game Region 4**
  Julie Vance
- [ ] **Fish & Game Region 5**
  Don Chadwick
  Habitat Conservation Program
- [ ] **Fish & Game Region 6**
  Gabrina Gatchel
  Habitat Conservation Program
- [ ] **Fish & Game Region 6 I/M**
  Brad Henderson
  Inyo/Mono, Habitat Conservation Program
- [ ] **Dept. of Fish & Game M**
  George Isaac
  Marine Region

Other Departments

- [ ] **Food & Agriculture**
  Steve Shaffer
  Dept. of Food and Agriculture
- [ ] **Depart. of General Services**
  Public School Construction
- [ ] **Dept. of General Services**
  Anna Garbeff
  Environmental Services Section
- [ ] **Dept. of Public Health**
  Bridgette Binning
  Dept. of Health/Drinking Water

Independent Commissions, Boards

- [ ] **Delta Protection Commission**
  Linda Flack
- [x] **Cal EMA (Emergency Management Agency)**
  Dennis Castrillo
- [ ] **Governor's Office of Planning & Research**
  State Clearinghouse

- [x] **Native American Heritage Comm.**
  Debbie Treadway
- [ ] **Public Utilities Commission**
  Leo Wong
- [ ] **Santa Monica Bay Restoration**
  Guangyu Wang
- [x] **State Lands Commission**
  Marina Brand
- [ ] **Tahoe Regional Planning Agency (TRPA)**
  Cherry Jacques

Business, Trans & Housing

- [ ] **Caltrans - Division of Aeronautics**
  Philip Crimmins
- [ ] **Caltrans - Planning**
  Terri Pencovic
- [ ] **California Highway Patrol**
  Scott Loetscher
  Office of Special Projects
- [ ] **Housing & Community Development**
  CEQA Coordinator
  Housing Policy Division

Dept. of Transportation

- [ ] **Caltrans, District 1**
  Rex Jackman
- [ ] **Caltrans, District 2**
  Marcelino Gonzalez
- [x] **Caltrans, District 3**
  Bruce de Terra
- [ ] **Caltrans, District 4**
  Lisa Carboni
- [ ] **Caltrans, District 5**
  David Murray
- [ ] **Caltrans, District 6**
  Michael Navarro
- [ ] **Caltrans, District 7**
  Elmer Alvarez
- [ ] **Caltrans, District 8**
  Dan Kopulsky
- [ ] **Caltrans, District 9**
  Gayle Rosander
- [ ] **Caltrans, District 10**
  Tom Dumas
- [ ] **Caltrans, District 11**
  Jacob Armstrong
- [ ] **Caltrans, District 12**
  Chris Herre

Cal EPA

Air Resources Board

- [ ] Airport Projects
  Jim Lerner
  - [ ] Transportation Projects
    Douglas Ito
  - [ ] Industrial Projects
    Mike Tollstrup
- [ ] **State Water Resources Control Board**
  Regional Programs Unit
  Division of Financial Assistance
- [x] **State Water Resources Control Board**
  Student Intern, 401 Water Quality Certification Unit
  Division of Water Quality
- [ ] **State Water Resouces Control Board**
  Steven Herrera
  Division of Water Rights
- [ ] **Dept. of Toxic Substances Control**
  CEQA Tracking Center
- [ ] **Department of Pesticide Regulation**
  CEQA Coordinator

Regional Water Quality Control Board (RWQCB)

- [ ] **RWQCB 1**
  Cathleen Hudson
  North Coast Region (1)
- [ ] **RWQCB 2**
  Environmental Document Coordinator
  San Francisco Bay Region (2)
- [ ] **RWQCB 3**
  Central Coast Region (3)
- [ ] **RWQCB 4**
  Teresa Rodgers
  Los Angeles Region (4)
- [x] **RWQCB 5S**
  Central Valley Region (5)
  - [ ] **RWQCB 5F**
    Central Valley Region (5)
    Fresno Branch Office
  - [x] **RWQCB 5R**
    Central Valley Region (5)
    Redding Branch Office
- [ ] **RWQCB 6**
  Lahontan Region (6)
  - [ ] **RWQCB 6V**
    Lahontan Region (6)
    Victorville Branch Office
- [ ] **RWQCB 7**
  Colorado River Basin Region (7)
- [ ] **RWQCB 8**
  Santa Ana Region (8)
- [ ] **RWQCB 9**
  San Diego Region (9)

- [ ] **Other** ______________

Last Updated on 01/10/11

POLICY JUSTIFICATION

Kingdom of Saudi Arabia – Night Vision Equipment

The Government of the Kingdom of Saudi Arabia has requested a possible sale of 200 High-performance In-Line Sniper Sight (HISS) Thermal Weapon Sights - 1500 meter, 200 MilCAM Recon III LocatIR Long Range, Light Weight Thermal Binoculars with Geo Location, 7,000 Dual Beam Aiming Lasers (DBAL A2), 6000 AN/PVS-21 Low Profile Night Vision Goggles (LPNVG), spare and repair parts, support equipment, technical documentation and publications, translation services, training, U. S. government and contractor technical and logistics support services, and other related elements of logistical and program support. The estimated cost is $330 million.

This proposed sale will contribute to the foreign policy and national security of the United States by helping to improve the security of a friendly country which has been, and continues to be, an important force for political stability and economic progress in the Middle East.

The proposed sale will augment Saudi Arabia's capability to meet current and future threats from potential adversaries during operations conducted at night and during low visibility conditions. The Royal Saudi Land Forces (RSLF) are responsible for regional, perimeter, and border security operations. This proposed sale meets their defense and counter-terrorism requirements to deter current insurgent activity along their southern border and contributes to their overall military posture. The RSLF already has night vision devices in its inventory and will have no difficulty absorbing this night vision equipment into its inventory.

The proposed sale of this equipment will not alter the basic military balance in the region.

The prime contractors will be FLIR Inc. in Boston, Massachusetts and Laser Devices, Inc. in Monterey, California. There are no known offset agreements proposed in connection with this potential sale.

Implementation of this sale will not require the assignment of any U.S. Government or contractor representatives to recipient.

There will be no adverse impact on U.S. defense readiness as a result of this proposed sale.

[FR Doc. 2011–12405 Filed 5–19–11; 8:45 am]
BILLING CODE 5001–06–C

DEPARTMENT OF DEFENSE

Department of the Army; Corps of Engineers

Notice of Intent To Prepare Draft Environmental Impact Statements/ Environmental Impact Reports for the Sutter Basin Feasibility Study and the Section 408 Permission for the Feather River West Levee Project, Sutter and Butte Counties, CA

AGENCY: Department of the Army, U.S. Army Corps of Engineers; DoD.

ACTION: Notice of intent.

SUMMARY: Pursuant to the National Environmental Policy Act of 1969, as amended, and the California Environmental Quality Act (CEQA), the U.S. Army Corps of Engineers (USACE) intends to prepare a separate Environmental Impact Statement/ Environmental Impact Report (EIS/EIR) for each of the following related flood risk management study efforts in north-central California: a Feasibility Study of flood risk management and related water resources problems in the Sutter Basin conducted by USACE under the authority of the Flood Control Act of 1962 (Pub. L. 87–874); and under Section 14 of the Rivers and Harbors Act

of 1899 (as amended) (33 U.S.C. 408), and Section 404 of the Clean Water Act (33 U.S.C. 1344), the proposed Feather River West Levee Project (FRWLP), sponsored by the Sutter Butte Flood Control Agency (SBFCA) as a locally driven flood management improvement project. The two projects are being studied in close coordination because they partially overlap in their study areas, purpose, potential improvements, potential effects, and involved parties. Therefore, a joint scoping process is being conducted for the two projects to explain the relationship between the two efforts and obtain public input in a manner that is convenient, efficient, and integrated. Figures of the two project areas can be viewed at the SBFCA *Web site at: http://www.sutterbutteflood.org/index.php/notices_documents.*

Sutter Basin Feasibility Study. On March 20, 2000, the State of California entered into a feasibility cost-sharing agreement (FCSA) with USACE to initiate a feasibility study. An amendment to the FCSA was signed in 2010, which included SBFCA as a non-Federal sponsor. The purpose of the study is to address flood risk, ecosystem restoration and recreation-related issues in the study area. If a Federal interest is determined, the study would result in a decision document, a General Investigation Feasibility Study report and EIS/EIR, which would be the basis for a recommendation to Congress for authorization. The Central Valley Flood Protection Board (CVFPB) and SBFCA are coordinating with USACE on the feasibility study. USACE, as the Federal lead agency under NEPA, and SBFCA, as the state lead agency under CEQA in coordination with CVFPB, have determined that an EIS/EIR will be prepared to describe alternatives, potential environmental effects, and mitigation measures.

FRWLP. SBFCA is planning the FRWLP to construct improvements to the west levee of the Feather River from Thermalito Afterbay to the Sutter Bypass confluence to meet Federal, state, and local flood protection criteria and goals. In 2010, an assessment district was enacted to provide local funding toward flood management improvements. These funds may be matched with those from the Early Implementation Program (funded through previous state bonds) administered by the California Department of Water Resources (DWR). In order to implement the project, the sponsor must acquire permission from USACE to alter the Federal project under Section 14 of the Rivers and Harbors Act of 1899 (as amended) (33 U.S.C. 408 or, Section 408). USACE also has authority under Section 404 of the Clean Water Act (33 U.S.C. 1344) over activities involving the discharge of dredged or fill material to waters of the United States, which are known to be in the project area. The purpose of the FRWLP would be to construct improvements as quickly as possible in advance of and compatible with the Sutter Basin Project. USACE, acting as the Federal lead agency under NEPA, and SBFCA, acting as the state lead agency under the CEQA in coordination with CVFPB, have determined that an EIS/EIR will be prepared to describe alternatives, potential environmental effects, and mitigation measures.

DATES: Public scoping meetings will be held on Monday, June 27 at 3:30 p.m. and 6:30 p.m. at the Veterans Memorial Community Building, 1425 Veterans Memorial Circle, Yuba City, CA and on Tuesday, June 28 at 3:30 p.m. and 6:30 p.m. at the Veterans Memorial Hall, 245 Sycamore Street, Gridley, CA. Send written comments by July 8, 2011 (see **ADDRESSES**).

ADDRESSES: Written comments and suggestions concerning the scope and content of the environmental information may be submitted to Mr. Matt Davis, U.S. Army Corps of Engineers, Sacramento District, Attn: Planning Division (CESPK–PD–R), 1325 J Street, Sacramento, CA 95814. Requests to be placed on the mailing list also should be sent to this address.

FOR FURTHER INFORMATION CONTACT: Questions about the proposed actions and environmental review process should be addressed to Matt Davis at (916) 557–6708, *e-mail: Matthew.G.Davis@usace.army.mil* (see **ADDRESSES**).

SUPPLEMENTARY INFORMATION:

1. *Proposed Action. Sutter Basin Feasibility Study.* USACE is conducting a feasibility study to evaluate structural and non-structural flood-risk-management measures, including re-operation of existing reservoirs; improvements to existing levees; construction of new levees; and other storage, conveyance, and non-structural options. The Sutter Basin study area covers approximately 285 square miles and is roughly bounded by the Feather River, Sutter Bypass, Wadsworth Canal, Sutter Buttes, and Cherokee Canal. Flood waters potentially threatening the study area originate from the Feather River watershed and/or the upper Sacramento River watershed, above Colusa Weir. The study area is essentially encircled by project levees and the high ground of Sutter Buttes. Geotechnical analysis and historical performance during past floods indicates the project levees are at risk of failure due to underseepage. The risk of levee failure coupled with the consequence of deep flooding presents a threat to public safety and property. Considering the collective changes to riparian and aquatic ecosystems brought about by agriculture, urbanization, mining, and flood risk management and water supply infrastructure, and the national concern for environmental quality and protection, every opportunity to restore and protect natural resources should be taken whenever changes in the water management system are being contemplated. Ecosystem restoration measures likely would include restoration of floodplain function and habitat. Recreation measures include those outdoor recreation opportunities associated with sustainable water resource development. The feasibility phase of this project is cost-shared 50% Federal, 50% non-Federal with the project sponsors, the State of California CVFPB and the SBFCA. The study will focus on alternatives in the study area that comprise flood risk management, ecosystem restoration, and recreation management measures. As part of the study, an EIS/EIR will be prepared with USACE as the lead agency under NEPA and SBFCA in cooperation with CVFPB as the lead agency under CEQA.

FRWLP. SBFCA is proposing a levee improvement project along the Feather River west levee under the California DWR's Early Implementation Program to expeditiously complete flood-risk reduction measures in advance of the Sutter Basin Feasibility Study. Known as the FRWLP, the project proposes to construct levee improvements between the Thermalito Afterbay and the Feather River/Sutter Bypass confluence. Primary deficiencies of the levee include through-seepage, under-seepage, and embankment instability (*e.g.,* overly steepened slopes). Alternatives considered may include measures such as slurry cutoff walls, seepage berms, stability berms, internal drains, relief wells, sheet-pile walls, slope flattening, and potential new levee alignments. As part of the project, an EIS/EIR is being prepared. USACE has authority under Section 14 of the Rivers and Harbors Act of 1899 (as amended) (33 U.S.C. 408), over alterations to Federal flood control project levees and any such alterations as proposed by SBFCA are subject to approval by USACE. USACE also has authority under Section 404 of the Clean Water Act (33 U.S.C. 1344) over activities involving the discharge of dredged or fill material to waters of the United States, which are known to be in

the project area. Due to these authorities, USACE is acting as the lead agency for the EIS pursuant to NEPA. SBFCA will be acting as the lead agency for the EIR according to CEQA as an agency of the State of California with delegated authority to approve the project.

2. *Alternatives.* The EIS/EIRs will consider several alternatives for reducing flood damage. Alternatives analyzed during the investigation will consist of a combination of one or more measures to reduce the risk of flooding. These measures include installing cutoff walls, and constructing seepage berms.

3. *Scoping Process.*

a. A series of public scoping meetings will be held on June 27 and 28, 2011, to present information to the public and to receive comments from the public on both the feasibility study and the FRWLP. These meetings are intended to initiate the process to involve concerned individuals, and local, state, and Federal agencies.

b. Significant issues to be analyzed in depth in the environmental documents include effects on hydraulics, wetlands and other waters of the U.S., vegetation and wildlife resources, special-status species, aesthetics, cultural resources, recreation, land use, fisheries, water quality, air quality, transportation, and socioeconomics; and cumulative effects of related projects in the study area.

c. USACE is consulting with the State Historic Preservation Officer to comply with the National Historic Preservation Act and with the U.S. Fish and Wildlife Service and National Marine Fisheries Service to comply with the Endangered Species Act. USACE also is coordinating with the U.S. Fish and Wildlife Service to comply with the Fish and Wildlife Coordination Act.

d. A 45-day public review period will be provided for individuals and agencies to review and comment on the draft environmental documents. All interested parties are encouraged to respond to this notice and provide a current address if they wish to be notified of the draft EIS/EIR circulation.

4. *Availability.* The draft EIS/EIR for the FRWLP is scheduled to be available for public review and comment in late 2011. The draft EIS/EIR for the Sutter Basin Feasibility Study is scheduled to be available for public review and comment in mid 2012.

Dated: May 12, 2011.

Andrew B. Kiger,

LTC, EN, Commanding.

[FR Doc. 2011–12510 Filed 5–19–11; 8:45 am]

BILLING CODE 3720–58–P

DEPARTMENT OF DEFENSE

Department of the Army; Corps of Engineers

Notice of Availability of the Final Programmatic Environmental Impact Statement for the Mechanical and Artificial Creation and Maintenance of Emergent Sandbar Habitat in the Riverine Segments of the Upper Missouri River, Missouri River Basin, United States

AGENCY: Department of the Army, U.S. Army Corps of Engineers, DoD.

ACTION: Notice of Availability.

SUMMARY: In accordance with the National Environmental Policy Act of 1969, as amended, the U.S. Army Corps of Engineers intends to file a Final Programmatic Environmental Impact Statement (FPEIS) for the Mechanical and Artificial Creation and Maintenance of Emergent Sandbar Habitat on the Riverine Segments of the Upper Missouri River with the U.S. Environmental Protection Agency. The FEIS is available for final public review. Details on the proposed action, location and areas of environmental concern addressed in the FPEIS are provided below under **SUPPLEMENTARY INFORMATION**.

DATES: The review period will be open 30 days from the date of this notice. The Record of Decision is anticipated to be issued in August, 2011.

ADDRESSES: Written comments should be sent to: Department of the Army; Corps of Engineers, Omaha District; CENWO–PM–AC; ATTN: Emergent Sandbar Habitat Programmatic EIS; 1616 Capitol Avenue; Omaha, NE 68102–4901, or e-mailed to: *Cynthia.s.upah@usace.army.mil.* Comments must be postmarked, e-mailed, or otherwise submitted no later than June 13, 2011. Copies of the FPEIS have been sent to all agencies and individuals who participated in the scoping process or public hearings and to those requesting copies. The FEIS is available online at: *http://www.moriverrecovery.org/mrrp/MRRP_PUB_DEV.download_documentation_peis.* To obtain a copy, please contact Ms. Cynthia Upah.

FOR FURTHER INFORMATION CONTACT: Ms. Cynthia Upah, Project Manager, by telephone: (402) 995–2672, by mail: 1616 Capitol Avenue, Omaha, NE 68102–4901, or by e-mail: *Cynthia.s.upah@usace.army.mil.* For inquires from the media, please contact the USACE Omaha District Public Affairs Officer (PAO), Ms. Monique Farmer by telephone: (402) 995–2416, by mail: 1616 Capitol Avenue, Omaha, NE 68102, or by e-mail: *Monique.l.farmer@usace.army.mil.*

SUPPLEMENTARY INFORMATION: 1. *Background.* The Emergent Sandbar Habitat (ESH) program is being implemented by the U.S. Army Corps of Engineers (Corps) for the benefit of the interior population of the Interior least tern (least tern) and the northern Great Plains piping plover (piping plover). This implementation program resulted from a Biological Opinion (BiOp) issued by the U.S. Fish and Wildlife Service (USFWS) in which the Reasonable and Prudent Alternative (RPA) called for the Corps to provide sufficient ESH acreage in order to meet biological metrics (fledge ratios) to avoid jeopardizing continued existence of the species, as defined by the Endangered Species Act (ESA).

The FPEIS is needed to provide National Environmental Policy Act (NEPA) coverage for the mechanical and artificial construction of ESH in the riverine segments of the Upper Missouri River, pursuant to the 2003 BiOp Amendment RPA IV(b) 3, and to compare impacts among a range of alternatives. The goal is to inform the selection of a preferred alternative that allows for the creation and replacement of sufficient habitat to support tern and plover populations on the Missouri River in a safe, efficient and cost-effective manner that minimizes negative environmental consequences.

Alternatives to the proposed project that are considered in the FPEIS include (1) no action, including existing program activities and no action; (2) and 6 action alternatives of various acreage creation. Environmental issues addressed in the FPEIS include hydrology, water quality, aggradation and degradation, biological resources, air quality, noise and recreation.

After detailed consideration of the environmental and social impacts, and cumulative effects, of the Alternatives, the Corps has identified an Adaptive Management Implementation Process (AMIP) as the preferred alternative, and not one of the specific acreage alternatives. The key aspect of the AMIP is that, rather than selecting a specific acreage alternative and pursuing such construction, actions would be progressively implemented with the focus on monitoring a combination of biological and physical metrics (measurements). Implementation of progressively larger acreage amounts of habitat would continue until the desired biological response is attained and sustained.

Join Us To Learn More About Local Flood Risk Reduction Efforts

Join the U.S. Army Corps of Engineers (USACE) and the Sutter Butte Flood Control Agency (SBFCA) for a public scoping meeting to learn about two proposed flood risk reduction efforts in Sutter and Butte counties. USACE's Sutter Basin Feasibility Study will look at potential improvements throughout the Sutter Basin, while SBFCA's Feather River West Levee Project is proposing to repair 44 miles of the river's west levee.

The public is encouraged to attend these meetings to comment on the scope of the proposed projects and the preparation of related environmental documents.

Meeting Dates & Times

June 27 at 3:30 p.m. and 6:30 p.m.
Veterans Memorial Community Building
1425 Veterans Memorial Circle, Yuba City

June 28 at 3:30 p.m. and 6:30 p.m.
Gridley Veterans Memorial Hall
249 Sycamore Street, Gridley

A presentation will begin 30 minutes after the start of each meeting. The same information will be presented at each meeting.

If you have questions or need special assistance or accommodations at a meeting, call 916-231-9618 at least 72 hours in advance of the meeting you plan to attend.

US Army Corps of Engineers
Sacramento District

SUTTER BUTTE FLOOD CONTROL AGENCY

DEPARTMENT OF WATER RESOURCES
STATE OF CALIFORNIA

www.sutterbutteflood.org • www.spk.usace.army.mil

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FOR IMMEDIATE RELEASE
CONTACT: INGRID NORGAARD
EMAIL: inorgaard@icfi.com
PHONE: 916-737-3000

Agencies Hosting Public Meetings Related to Proposed Flood Improvements in Sutter and Butte Counties

The public is invited to attend to provide input on environmental process

Yuba City, June 22, 2011—The U.S. Army Corps of Engineers' (USACE) Sacramento District and the Sutter Butte Flood Control Agency (SBFCA) will hold four public scoping meetings on June 27 and 28 to provide the public an opportunity to comment on proposed regional flood risk management projects.

The purpose of the USACE's Sutter Basin Project is to address flood risk management, ecosystem restoration, and recreation issues in the Sutter Basin study area. The project is currently in the feasibility study phase. The study area covers approximately 285 square miles and is roughly bounded by the Feather River, Sutter Bypass, Wadsworth Canal, Sutter Buttes and Cherokee Canal.

SBFCA is planning the Feather River West Levee Project (FRWLP) to address levee deficiencies found along 44 miles of the west levee of the Feather River from the Thermalito Afterbay south to the Sutter Bypass. The west levee provides flood risk management benefits to the cities of Yuba City, Gridley, Live Oak, and Biggs and portions of unincorporated areas of Butte and Sutter counties. Measures are being evaluated to meet Federal, state, and local flood protection criteria and goals.

The Sutter Basin Project and FRWLP are being studied in close coordination because of related study areas, purpose, potential measures and potential effects. It is anticipated that two separate environmental impact statements/environmental impact reports (EIS/EIR) will be developed—one for the Sutter Basin Project and one for FRWLP. The public release of the draft EIS/EIR to evaluate FRWLP is scheduled for early 2012. The release of the Sutter Basin Project's draft EIS/EIR has yet to be determined. The California Department of Water Resources and Central Valley Flood Protection Board are also involved in these two efforts.

Combined and coordinated scoping for the two efforts is being conducted to ensure an efficient process for interested stakeholders. Public input will be solicited about the content of the environmental documents. Please join us at one of four scoping meetings to provide input.

City of Yuba City
June 27 at 3:30 p.m. *and* 6:30 p.m.
Veteran's Memorial Community Bldg.
1425 Veterans Memorial Circle,
Yuba City

City of Gridley
June 28 at 3:30 p.m. *and* 6:30 p.m.
Gridley Veteran's Memorial Hall
249 Sycamore Street, Gridley

-MORE-

A presentation will be given 30 minutes after each meeting begins. The content of all four meetings will be the same. For questions about the meetings or to make special accommodations for attendees, contact Ms. Norgaard at 916-737-3000 or via email at inorgaard@icfi.com.

Learn more about the Sutter Basin Project at www.spk.usace.army.mil and about the FRWLP at www.sutterbutteflood.org.

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Attachment B

- Display boards
- Power Point presentation
- Fact sheet
- Comment card templates

Station 2 - Overview, Purpose, and Objectives 110x13

2A
About the SBP
36x18

2B
SBP Study Area MAP
36x24

2C
SBP Timeline
36x18

2D
Inside Look at a Levee
30x24

2E
Typical Levee Deficiencies
30x24

2F
About the FRWLP
36x18

2G
FRWLP Study Area MAP
36x24

2H
FRWLP Timeline & Funding
36x18

Station 3 - Potential Measures 110x13

3A
Slurry Wall
25x20

3B
Stability Berm
25x20

3C
Seepage Berm
25x20

3D
Relief Well
25x20

3E
Sheet-Pile Wall
25x20

3F
Slope Flattening
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3G
Internal Drain
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3H
New/Relocated Levee
25x20

3I
Re-Operation
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3J
Non-Structural
25x20

3K
Ecosystem Restoration
25x20

3L
Recreation
25x20

Station 4 - Environmental Process 110x13

4A
About NEPA/CEQA
24x32

4B
Scoping
24x32

4C
Enviro Issues
24x32

4D
Regulatory Compliance
24x32

4E
SBP Photo
52x32

4F
FRWLP Photo
52x32

Welcome to the Sutter Basin Project & Feather River West Levee Project

Environmental Scoping Meeting

US Army Corps of Engineers®
Sacramento District

Overview, Purpose, and Objectives

About the Sutter Basin Project

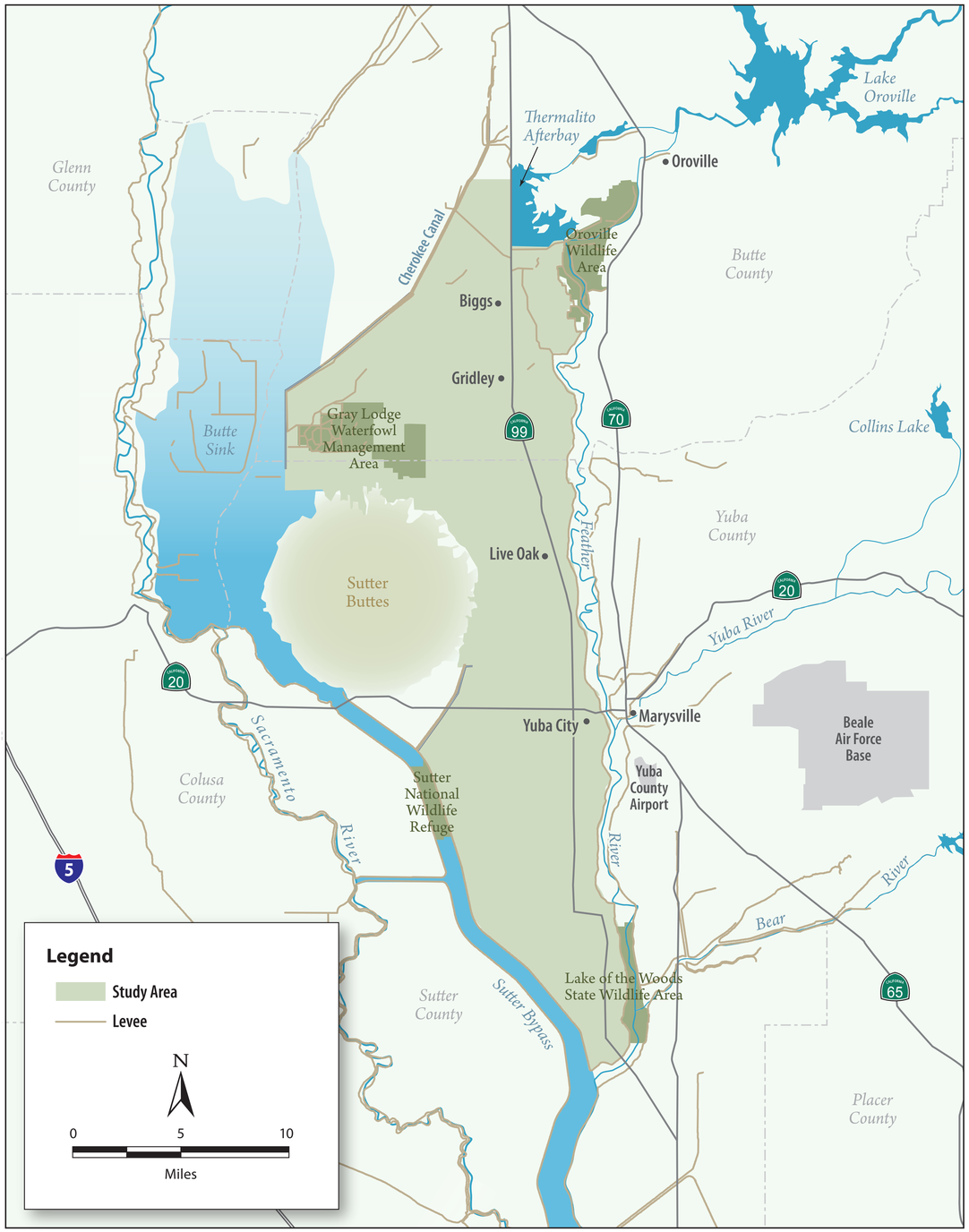
In 2000, the State of California and USACE entered into a cost-sharing agreement to initiate a feasibility study within the Sutter Basin. An amendment of the cost-sharing agreement was signed in July 2010 to include SBFCA as a non-Federal sponsor. The purpose of the feasibility study is to address flood risk management, ecosystem restoration, and recreation issues in the study area.

The Sutter Basin Project feasibility study evaluates approximately 285 square miles that are roughly bounded by the Feather River, Sutter Bypass, Wadsworth Canal, Sutter Buttes, and Cherokee Canal. The study area is essentially encircled by project levees and the high ground of the Sutter Buttes. Past flood events and geotechnical analysis show these levees have a higher probability of failure related to through-and under-seepage than levees designed to meet current standards. Additionally, the levees are at risk of overtopping from floods greater than they are designed to withstand.

As part of the Sutter Basin Project feasibility study, USACE is evaluating a variety of flood risk management measures that could include re-operation of reservoirs; improvements to existing levees; construction of new levees; other storage, conveyance, and non-structural options; and measures that could potentially restore the ecosystem within the study area and develop or expand recreation facilities.

This study will be the basis for a recommendation to Congress to address water resources and related issues within the study area.

Sutter Basin Project Area

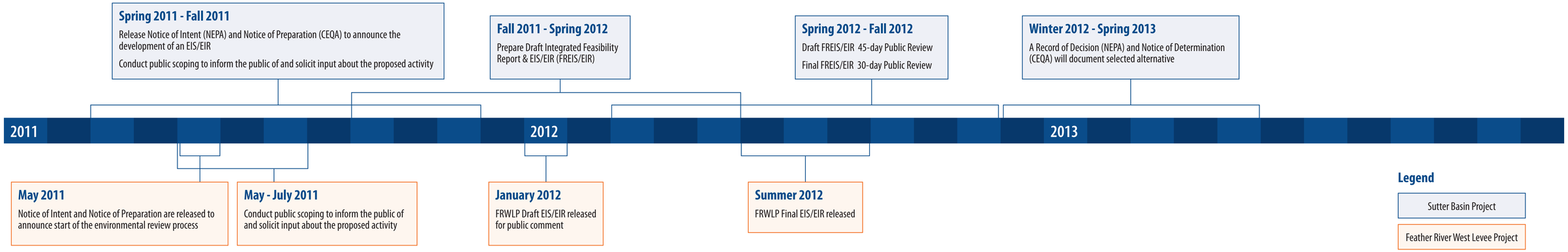


Sutter Basin Project Funding and Timeline

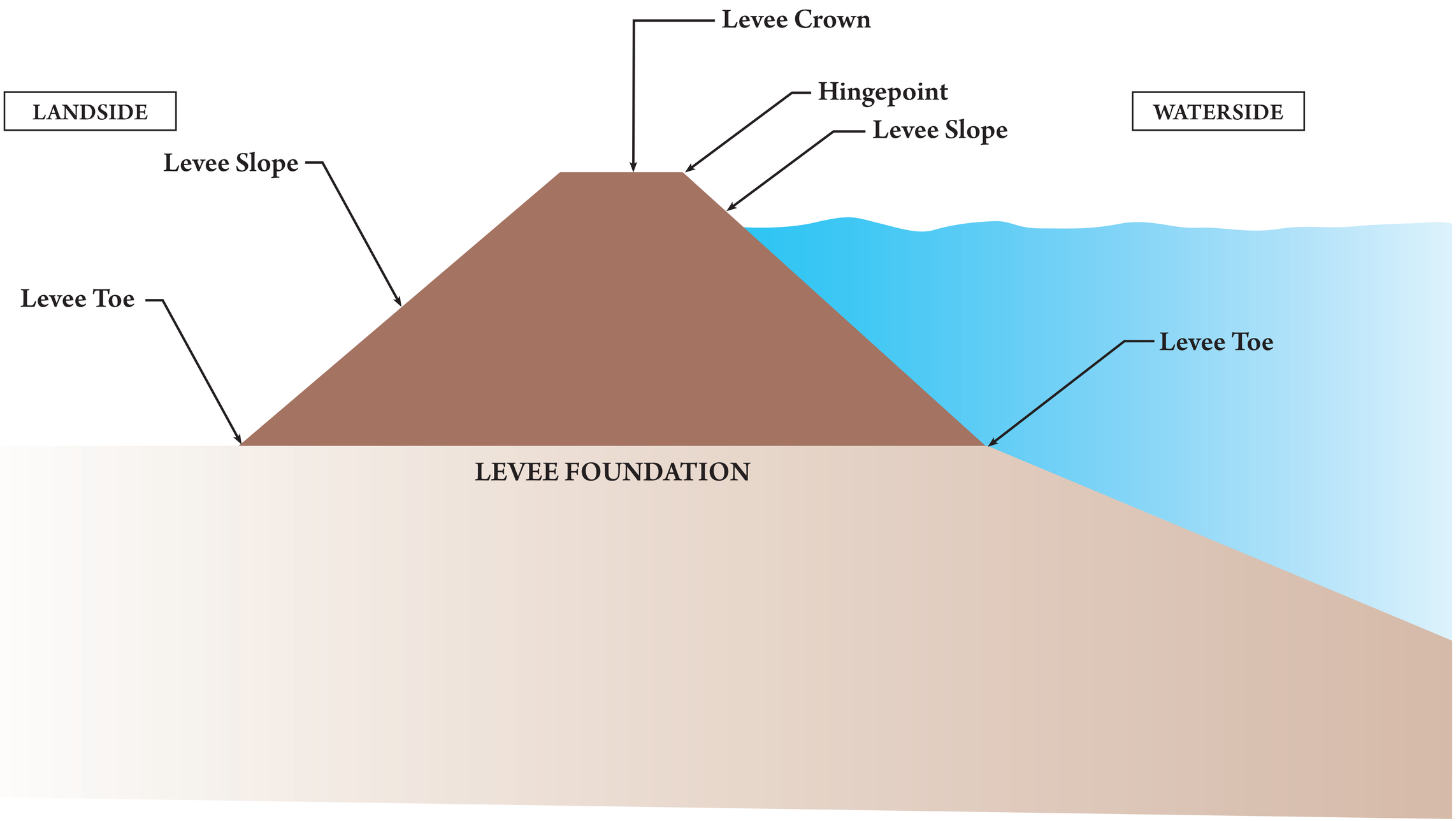
Funding

The feasibility study phase of this project is cost-shared; USACE will fund 50% and SBFCA and the State of California will fund the remaining 50% of the project.

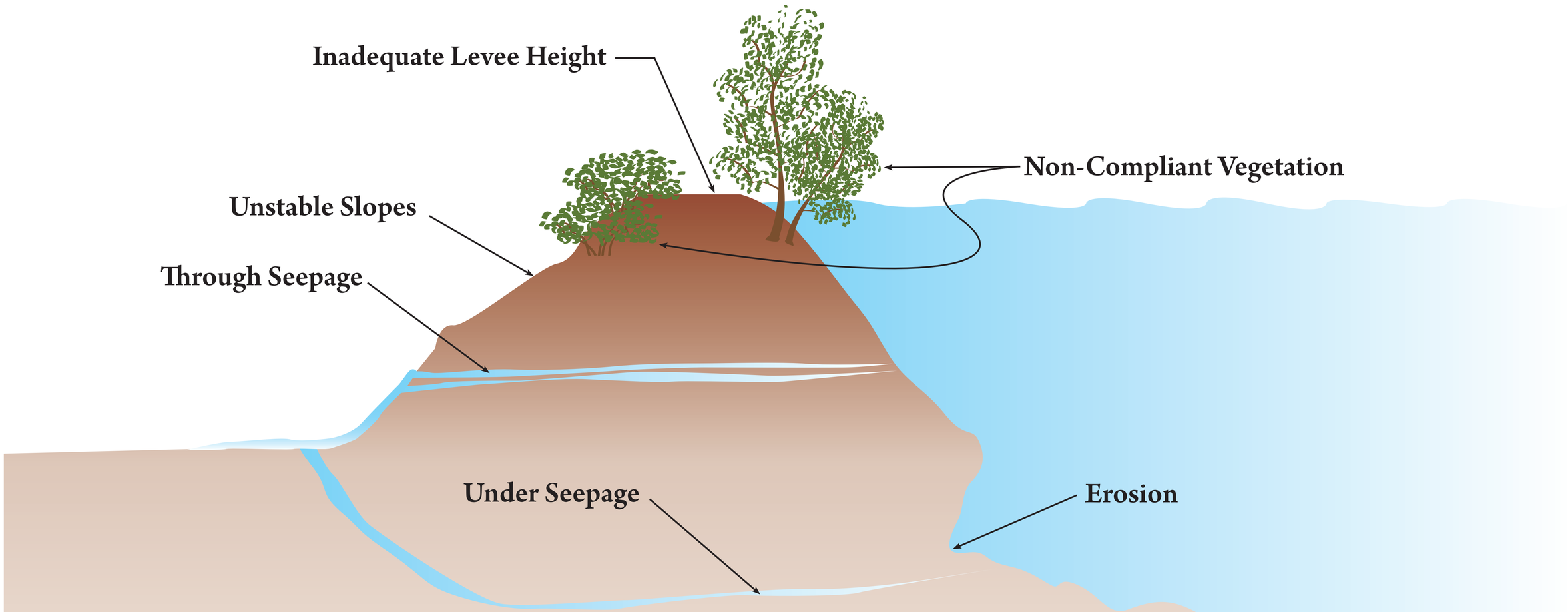
Timeline



An "Inside" Look at a Levee



Typical Levee Deficiencies



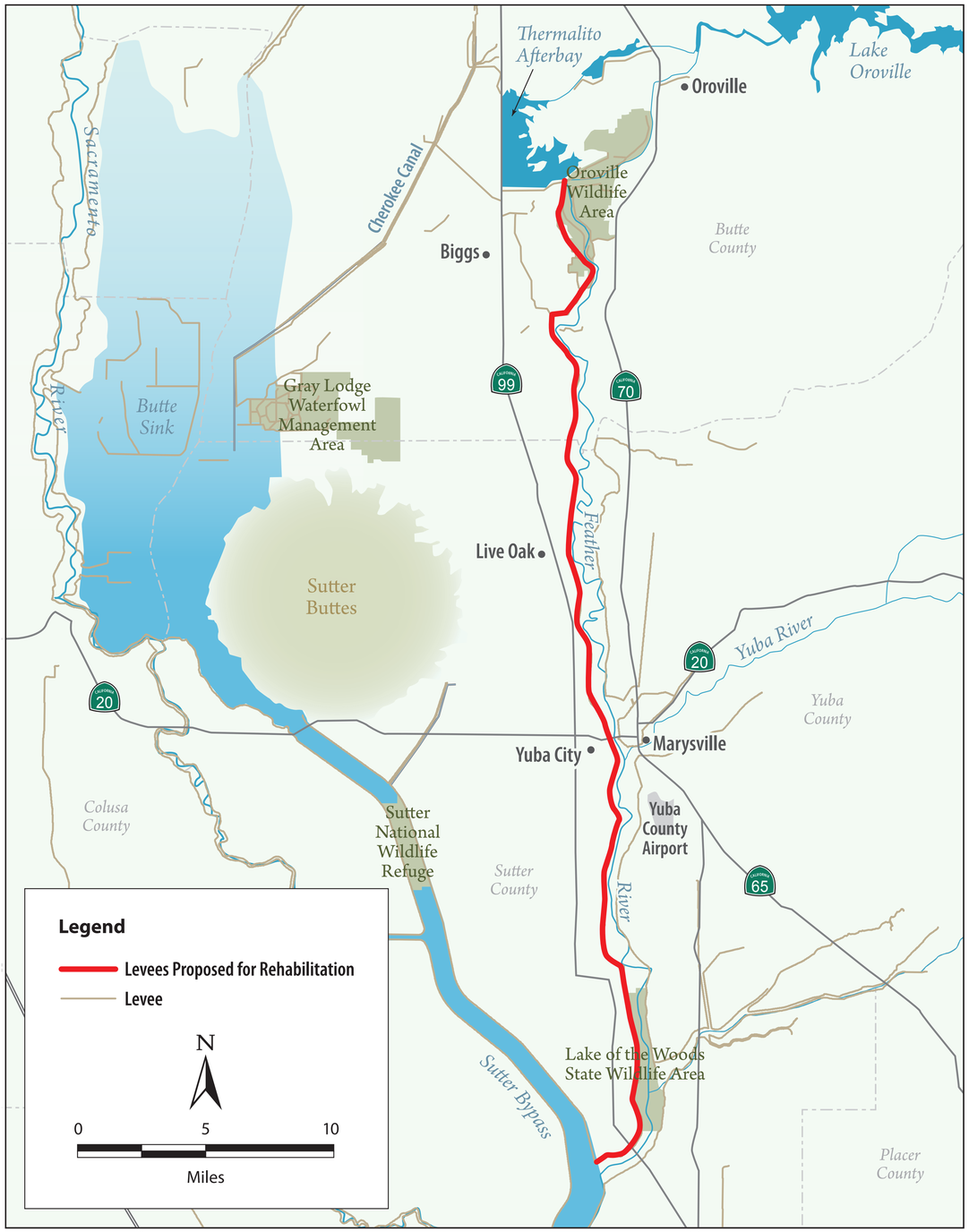
- **Unstable Slopes - irregular or overly steep slopes compromise the levee structure**
- **Inadequate levee height - levee height may be too low relative to predicted water levels**
- **Non-Compliant Vegetation - can lead to levee instability and hinder levee monitoring and maintenance**
- **Erosion - water flow, wakes and waves, remove soil material, damaging the levee**
- **Seepage**

About the Feather River West Levee Project

Communities in both Butte and Sutter Counties have an unfortunate historical knowledge of devastating flood events within the region. Sutter Butte Flood Control Agency (SBFCA) is planning the Feather River West Levee Project (FRWLP) to address levee deficiencies found along 44 miles of the west levee of the Feather River from the Thermalito Afterbay south to the Sutter Bypass. Measures are being evaluated to meet Federal, state, and local flood protection criteria and goals. The FRWLP is expected to:

- Increase public safety by providing 200-year flood protection from Yuba City north to the Thermalito Afterbay, and the appropriate level of flood protection south of Yuba City (in conjunction with repairs to the Sutter Bypass, which are the responsibility of the state).
- Save property owners millions of dollars annually in flood insurance costs by delaying, preventing, or cutting short FEMA floodplain mapping.
- Allow cities and counties to implement general plans, which will soon be restricted for any urban or urbanizing community without 200-year flood protection. This would not apply to areas with fewer than 10,000 residents.
- Sustain and grow the local economy by creating construction jobs, protecting property values, and allowing for responsible development.

Feather River West Levee Project Area



Feather River West Levee Project Funding and Timeline

Funding

The FRWLP is estimated at $250 million for construction. A local assessment district enacted in 2010 will pay 29% of the project cost and the State of California is expected to pay the remaining share.

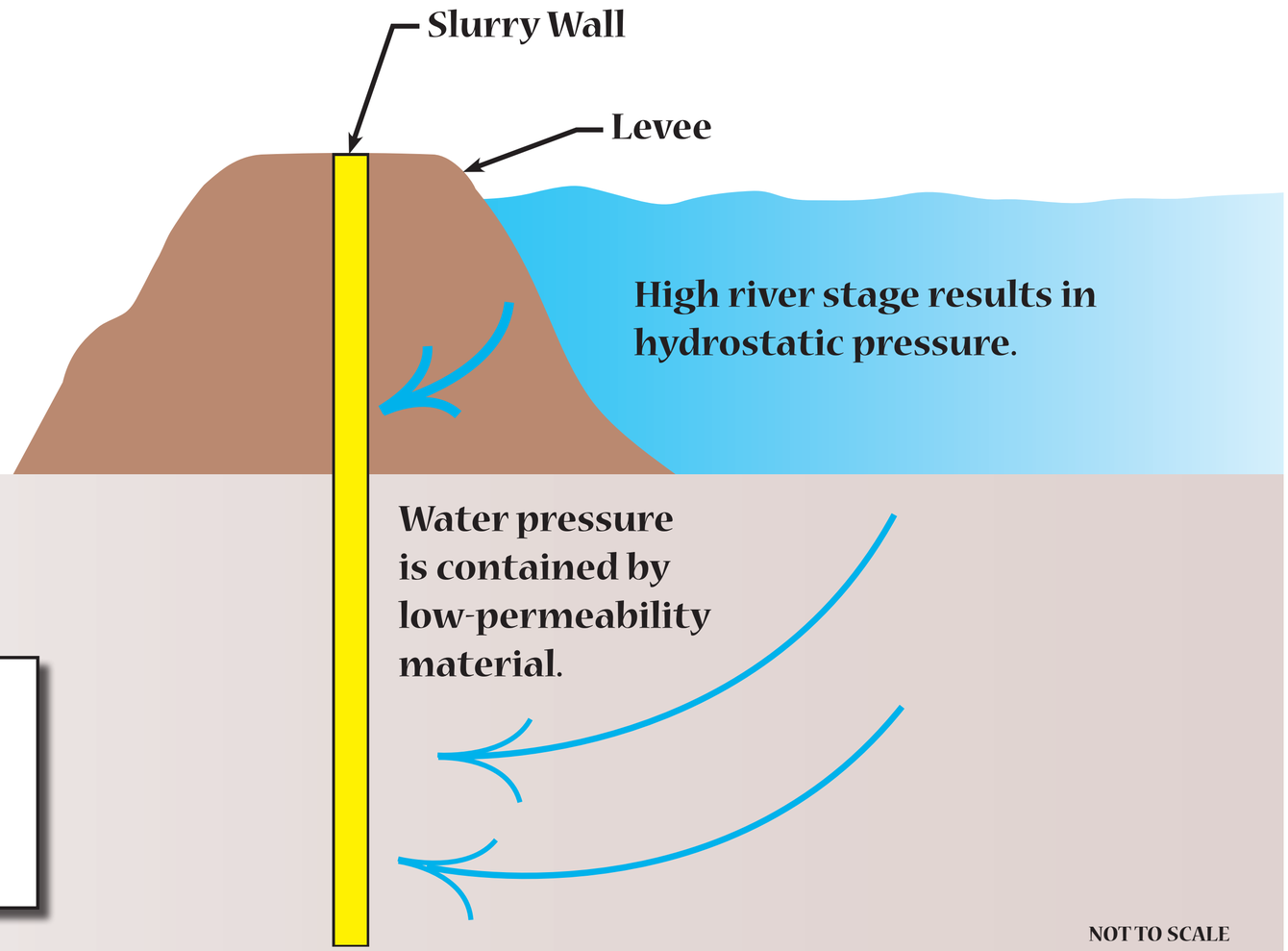
Timeline

Environmental specialists are currently analyzing the effects the FRWLP could have if implemented, to comply with the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA). This analysis will help engineers finalize the project design, and request Federal and state permits. The goal is to construct the FRWLP as quickly as possible in advance of and compatible with the Sutter Basin Project, potentially beginning construction in 2013.

Potential Measures

Slurry Cut-off Wall

Concept:
Water-seepage and through-seepage
are controlled by a low-permeability wall
constructed within the levee cross section.

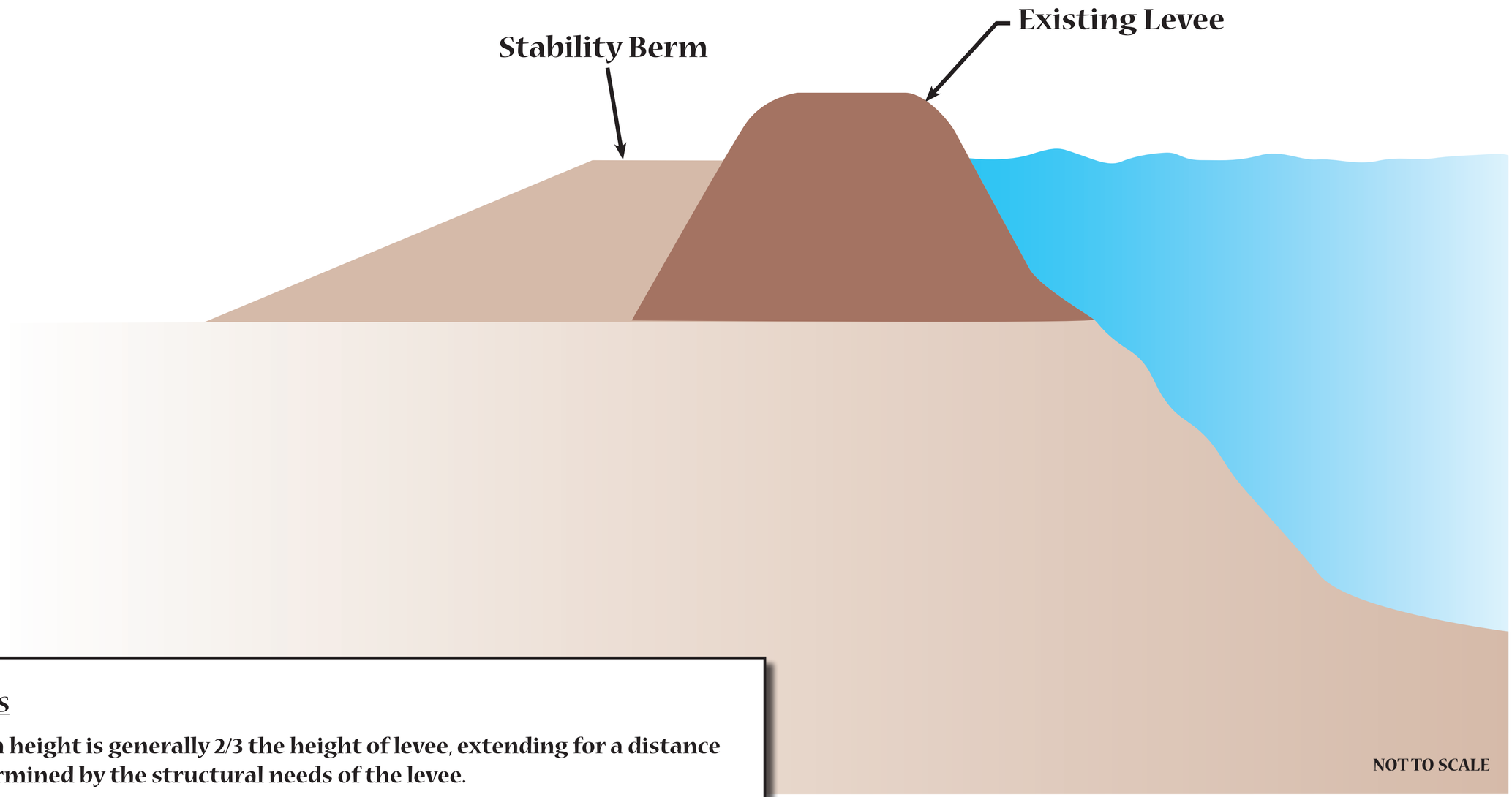


DETAILS

- Constructed via traditional slot trench, deep soil mix method, or jet grouting.
- Wall is approximately 3 ft wide and up to 140 ft deep.

Stability Berm

Concept:
Provides additional support to levee
to increase strength.

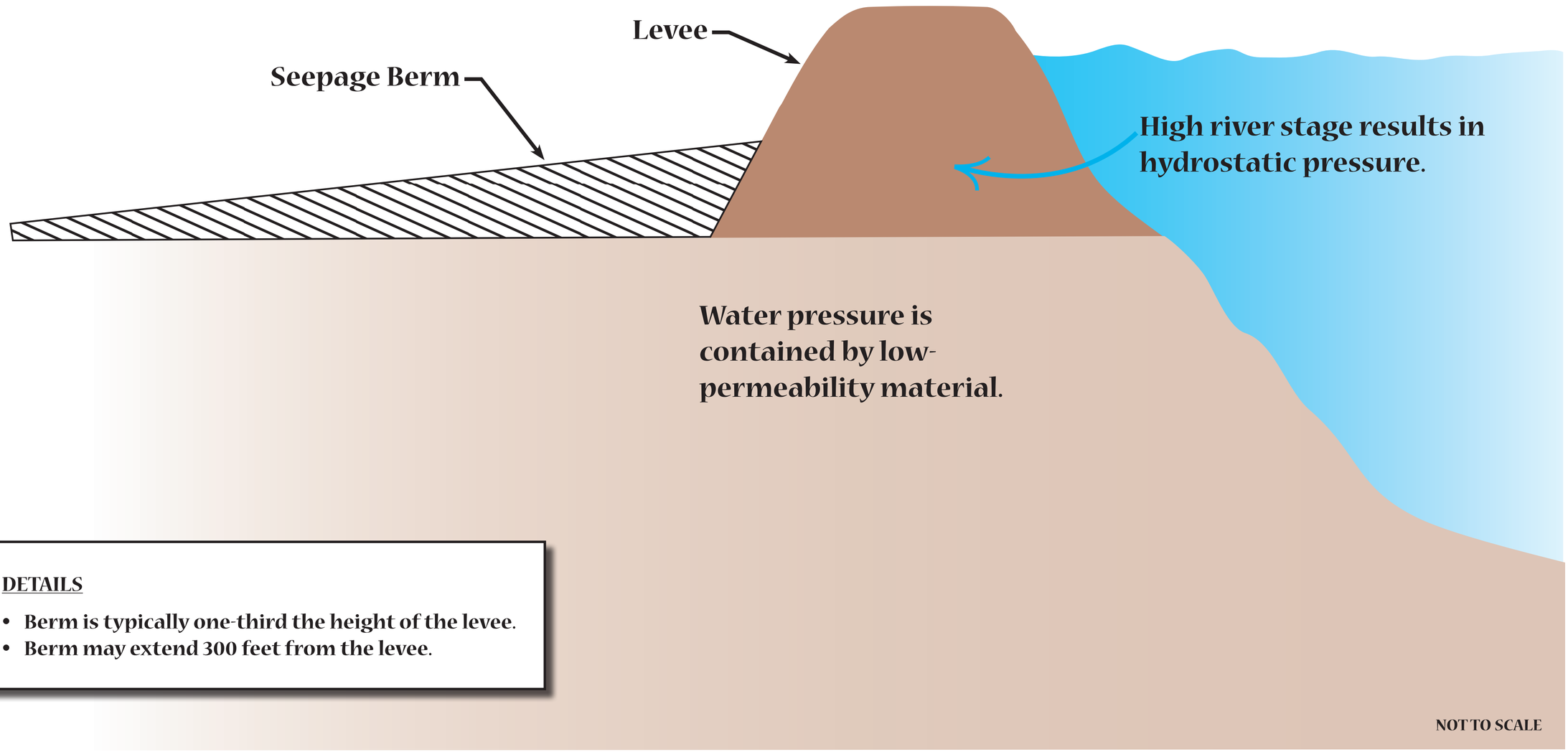


DETAILS

- **Berm height is generally 2/3 the height of levee, extending for a distance determined by the structural needs of the levee.**

Seepage Berm

Concept:
Water pressure is contained and dispersed by a thickened soil layer.

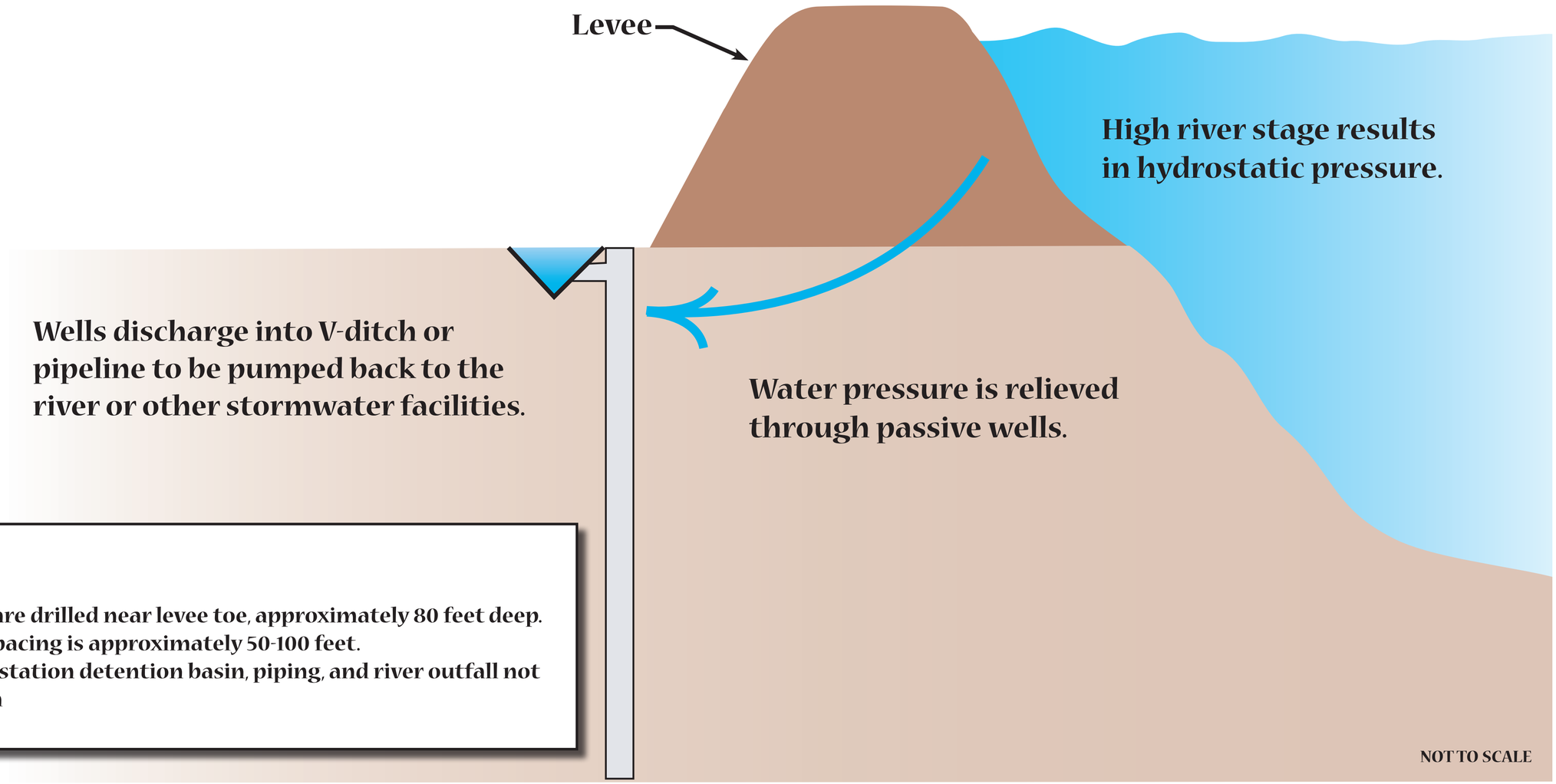


DETAILS

- Berm is typically one-third the height of the levee.
- Berm may extend 300 feet from the levee.

Relief Well

Concept:
Water pressure is relieved via passive wells, which direct water discharge into a collection system.

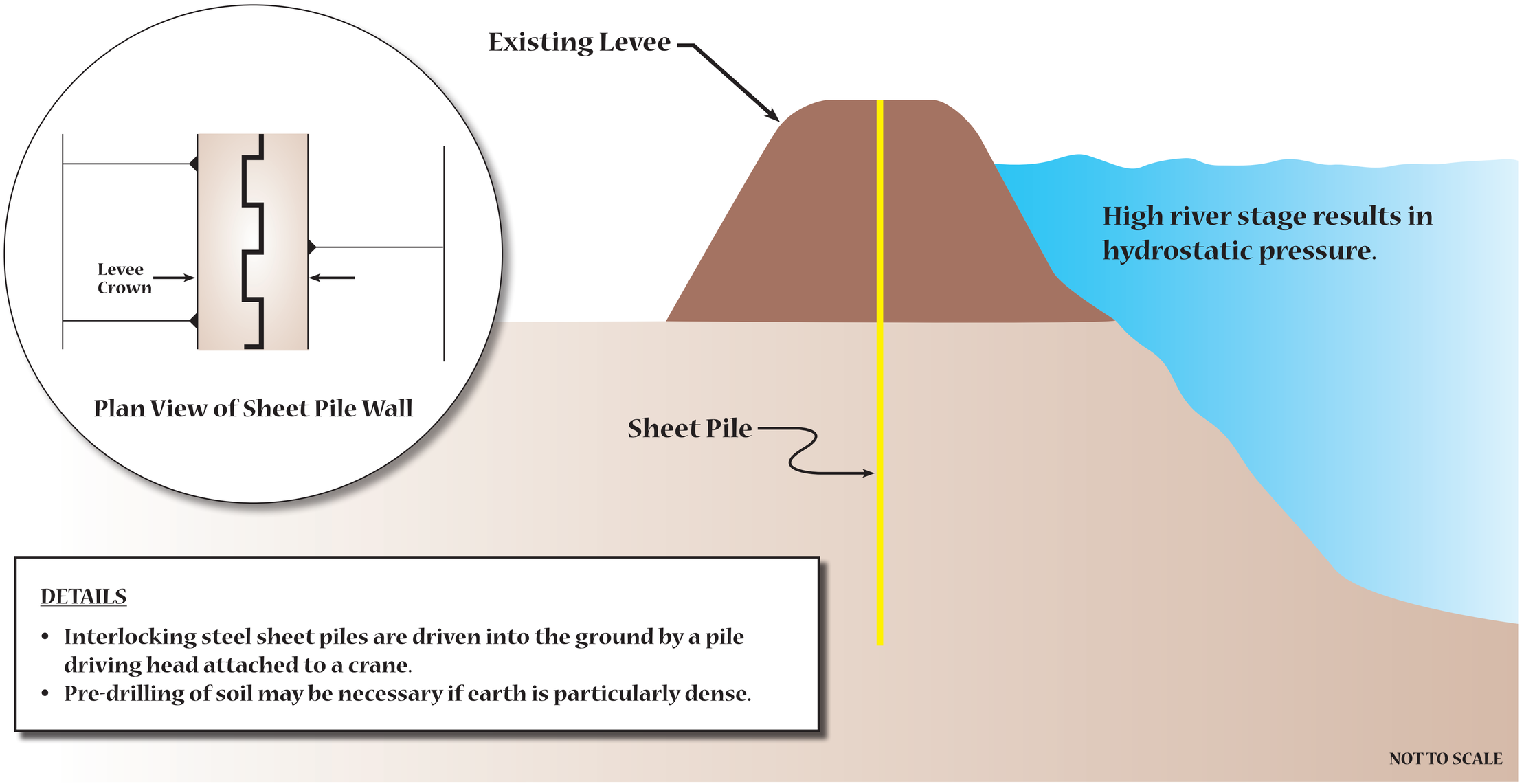


DETAILS

- Wells are drilled near levee toe, approximately 80 feet deep.
- Well spacing is approximately 50-100 feet.
- Pump station detention basin, piping, and river outfall not shown

Sheet Pile Wall

Concept:
Steel panels are driven into the levee core to provide a seepage barrier.

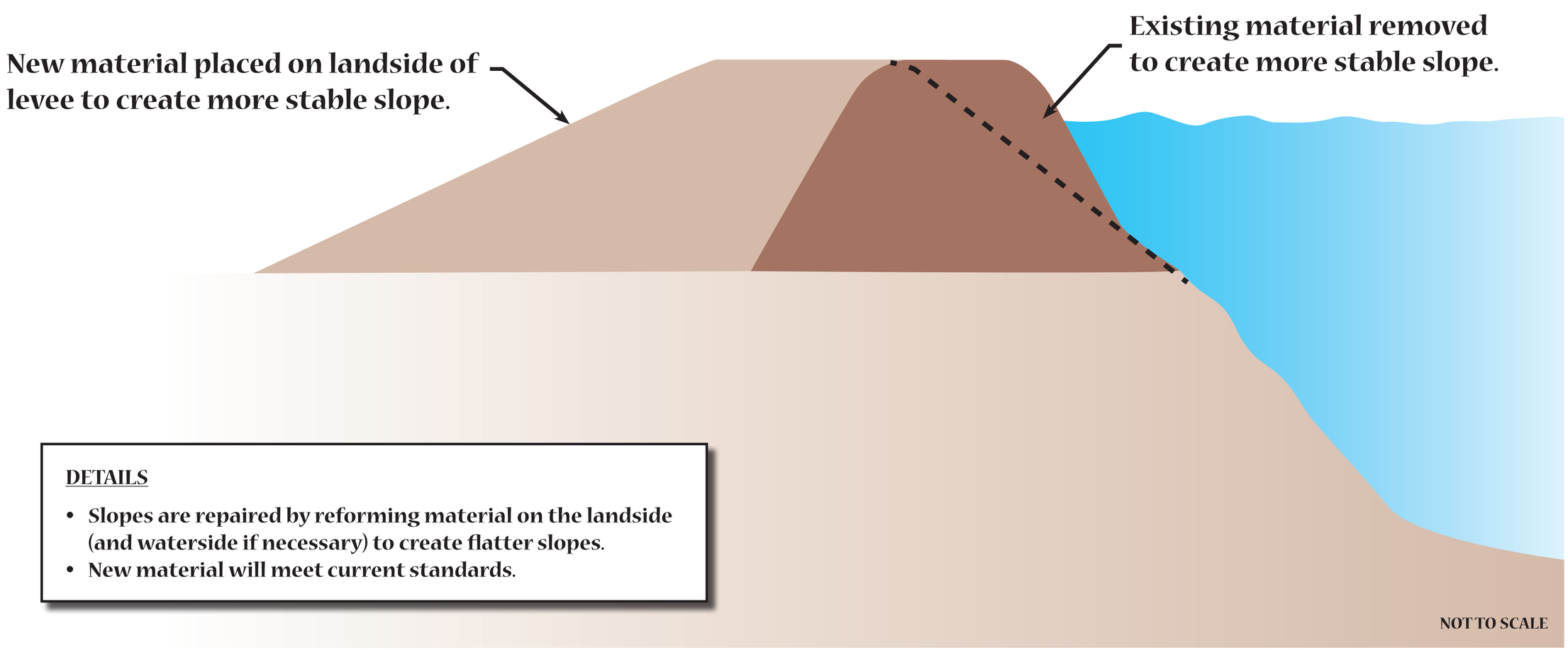


DETAILS

- Interlocking steel sheet piles are driven into the ground by a pile driving head attached to a crane.
- Pre-drilling of soil may be necessary if earth is particularly dense.

Slope Flattening

Concept:
Flatter slopes are more stable and
less susceptible to erosion.

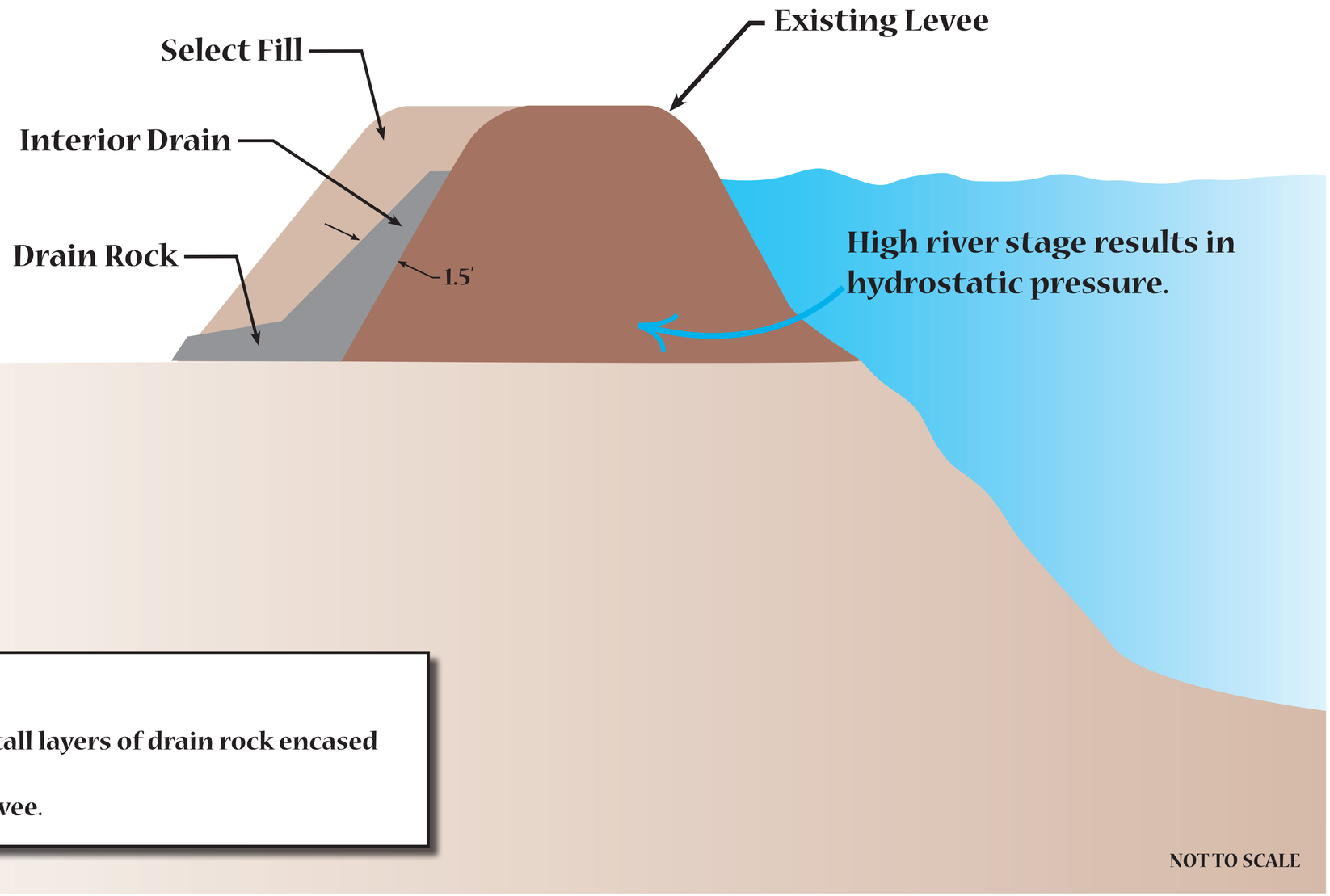


DETAILS

- Slopes are repaired by reforming material on the landside (and waterside if necessary) to create flatter slopes.
- New material will meet current standards.

Internal Drain

Concept:
Capture any through-seepage and
direct it away from the face of the levee.

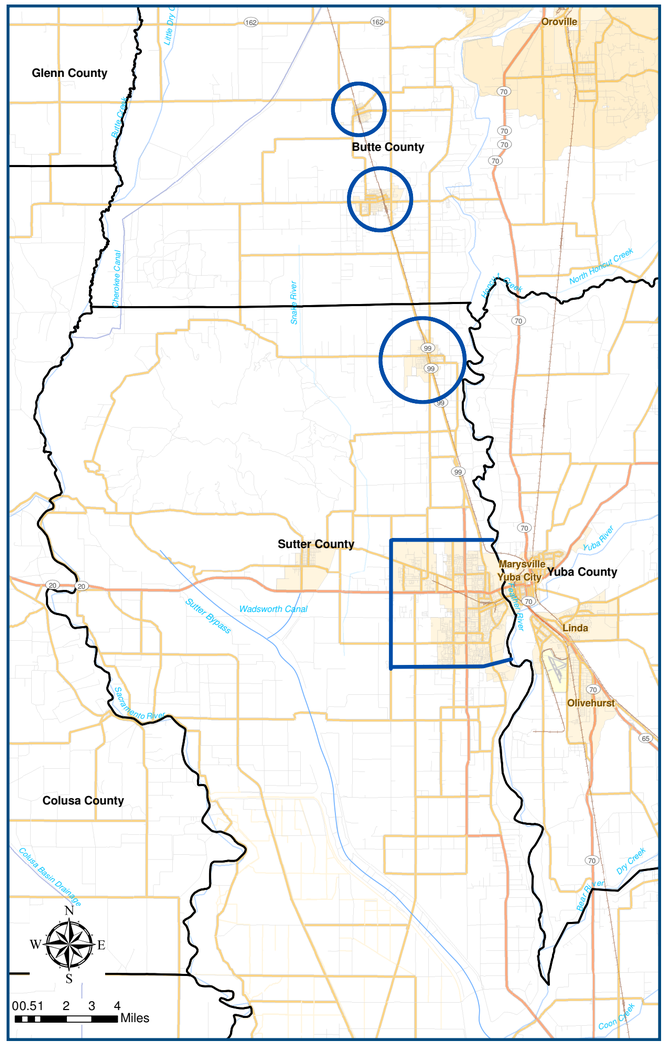


DETAILS

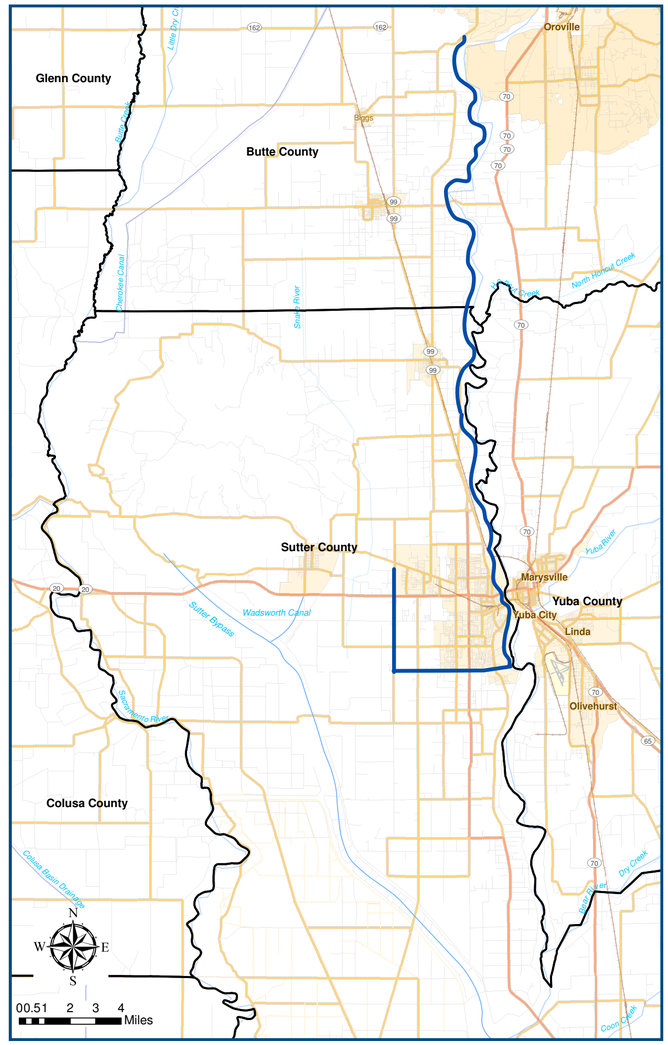
- Levee is partially excavated to install layers of drain rock encased in filter sand.
- Placed on the landside 1/3 of the levee.

New Levee Location

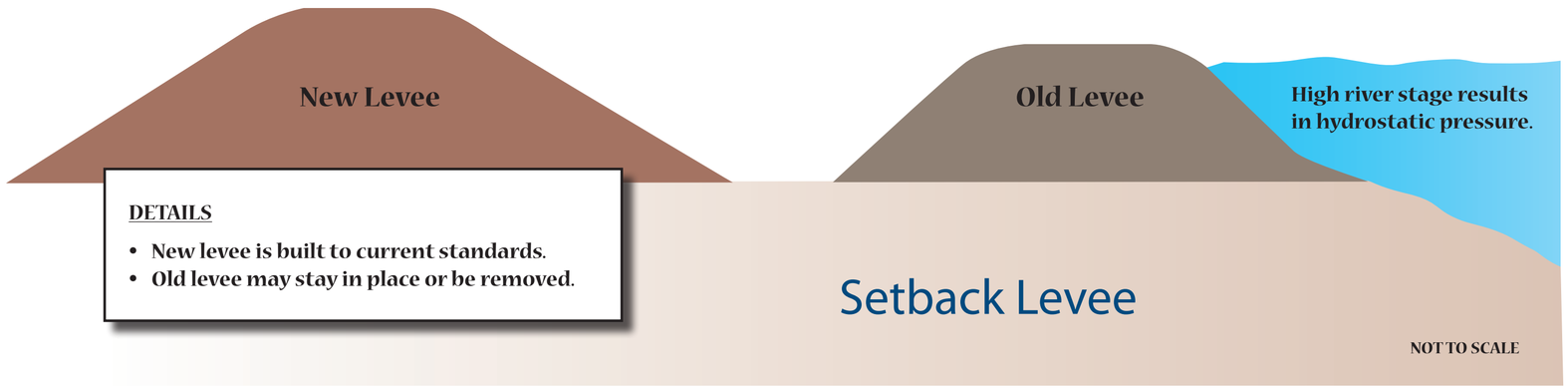
Concept:
A new levee is built where the existing levee is not readily repairable or where a change in the floodplain is an option (such as setback levees, ring levees, J-levees or similar concepts).



Ring Levees



J-Levees



Reservoir Reoperation Flood Risk Management

Reduce flood risk by improving a reservoir's ability to store peak flood flows through a variety of operational or physical modifications.

Examples:

- Reallocate storage for flood risk management purposes.
- Utilize flood forecast based operations to release storage in anticipation of a flood event.

Non-Structural Flood Risk Management

Non-structural measures reduce flood risk without significantly altering the nature or extent of the flooding. They do this by changing the use made of the floodplains, or by accommodating existing uses to the flood hazard.

Examples:

- Flood proofing
- Relocation of structures
- Flood warning/preparedness systems
- Regulation of floodplain uses

Ecosystem Restoration

Existing levees have isolated the floodplains from waterways, thereby eliminating significant floodplain habitats for native species, including Federally-listed species and other special-status species. There is potential to restore these areas in conjunction with flood risk management measures.

Examples:

- Realign levees to restore floodplains and river function
- Establish riparian/wetland habitat in conjunction with detention basins and other storage facilities
- Modify water inflow to select ponds to restore fish production and riparian/wetland habitats
- Convert nonnative habitats to native riparian/wetland habitats
- Eradicate exotic invasive plant species and establish native habitat

Recreation

An opportunity exists to create or enhance recreation features consistent with flood damage reduction and ecosystem restoration project features.

Examples:

- Multi-purpose paved trail on levee crown with access points, highway under crossings, public safety facilities, and appropriate signage
- Provide wildlife viewing platforms
- Picnic areas with associated parking and facilities
- Provide increased river access points

Environmental Process

About NEPA & CEQA

It is anticipated the Sutter Basin Project and FRWLP will result in two separate environmental impact statements/ environmental impact reports (EIS/EIR)—one for each project. Both documents will disclose an activity's potential alternatives, potential effects, and proposed mitigation measures in compliance with the National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA), respectively.

A joint EIS/EIR is prepared when there is both a Federal and state agency interest in an activity, and/or when a state agency needs permission to perform an action under Federal jurisdiction. The development of the draft joint EIS/EIR to evaluate the FRWLP is underway and scheduled for release in early 2012. The release date of USACE's draft joint EIS/EIR for the Sutter Basin Project has yet to be determined.

Scoping and Other Public Engagement

Scoping is a process used to inform the public of a proposed activity and provide an opportunity to give comment, insight, and local information related to the range of alternatives, environmental effects, and/or issues of concern related to the proposed activity.

Because the agencies are working to create two joint, albeit separate, environmental documents for these two projects, a joint scoping period is also being held. During the scoping process public input will be solicited about the scope of the environmental documents and the agencies will communicate with the public about the two efforts.

Scoping is particularly informative in a flood risk management project because the citizens of the effected community could have insight into the performance of a levee that the agencies are unaware of (think locations of under-seepage or boils or areas of general poor levee performance).

The comments received from public scoping will be used to inform development of the alternatives; defining the environment and resources potentially affected by the alternatives; and analysis of effects resulting from the alternatives. The affected environment broadly includes physical, biological, and social topic areas. Effects are identified and analyzed both for project construction and long-term operations and maintenance.

Potential Environmental Issues

The effect of a proposed activity on natural and built resources will be evaluated in the environmental documents for the Sutter Basin Project and the FRWLP. Resources analyzed in the EIS/EIRs will include, but are not limited to:

- Transportation and Navigation
- Vegetation and Wetlands
- Socioeconomics and Environmental Justice
- Wildlife
- Fisheries and Aquatics
- Cultural Resources
- Air Quality, GHG and Climate Change
- Public Health and Environmental Hazards
- Land Use and Agriculture

Other Regulatory Compliance

USACE and SBFCA will need to comply with several regulations to complete the environmental process. Those could include:

Section 404: Establishes regulation of discharges of pollutants

- USACE grants 404 permits. The compliance mechanism is an Individual Permit, including 404(b)(1) alternatives analysis to identify least environmentally damaging practicable alternative (LEDPA)

Section 401: Requires certification that the project will not adversely affect water quality

- Administered by State of California through the Regional Water Quality Control Board

Rivers and Harbors Act

- Section 14 of the Rivers and Harbors Act requires permission from USACE for alterations to Federal flood control projects
    - More commonly referred to as Section 408

Endangered Species Act

- Purpose is to protect species and the ecosystems upon which they depend
- Administered by two Federal agencies: NMFS and USFWS
- Section 7 requires Federal agencies to ensure any action authorized, funded, or carried out is not likely to jeopardize the continued existence of a listed species or modify their habitat
- If a listed species may be present, the agency must conduct a biological assessment (BA)
    - Analyzes the potential effects of the project on listed species and critical habitat
- NMFS/USFWS then determines a need for a biological opinion (BO) or letter of concurrence

National Historic Preservation Act

- Section 106: Requires consideration of resources eligible or potentially eligible for the National Register of Historic Places
    - Administered by California State Historic Preservation Officer (SHPO)

Fish and Game Code

- Section 1600 et seq.: Work on the waterside of the levee will require Streambed Alteration Agreement
- Section 2050 et seq.: Potential effects on listed species will require demonstration that effects have been fully mitigated or incidental take permit

Thank you for your interest in these two public safety projects. Please provide us with your input on the scope of the projects and the environmental analysis here.

US Army Corps of Engineers®
Sacramento District

Welcome to the

SUTTER BASIN PROJECT FEASIBILITY STUDY
&
FEATHER RIVER WEST LEVEE PROJECT

PUBLIC SCOPING MEETING

JUNE 27 & 28, 2011

US Army Corps
of Engineers®
Sacramento District

Presentation Outline

1. Coordinated Flood Management Efforts
2. How Did We Get Here?
3. A Closer Look at Each Project
4. The Environmental Process

US Army Corps of Engineers®
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Coordinated Flood Management Efforts

US Army Corps of Engineers®
Sacramento District

Sutter Basin Project Feasibility Study

- Led by U.S. Army Corps of Engineers (USACE)
- Initiated in 2001
- Purpose is to evaluate a Federal interest in flood risk management, ecosystem restoration, and recreation projects in study area
- Coordinating with Sutter Butte Flood Control Agency (SBFCA), Central Valley Flood Protection Board (CVFPB), and California Department of Water Resources (DWR)

US Army Corps of Engineers®
Sacramento District

FEATHER RIVER WEST LEVEE PROJECT (FRWLP)

- Led by local agency SBFCA
- Initiated upon approval of annual property assessment in 2010
- Purpose is to address levee deficiencies in the Feather River's west levee from Thermalito Afterbay to Sutter Bypass
- Construction start targeted for 2013
- SBFCA is coordinating with USACE, CVFPB, and DWR

US Army Corps of Engineers®
Sacramento District

A Joint Approach

- Studied in coordination due to similar study areas, purpose, potential improvements, effects, and parties involved
- Separate but coordinated EIS/EIRs will be developed for each project
- USACE is NEPA lead and SBFCA is CEQA lead agency for environmental process, jointly coordinating with CVFPB and DWR

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How Did We Get Here?

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A Brief Local History

- Before 1850, the Feather and Sacramento Rivers overflowed their banks in high-water periods every few years
- Sediment from hydraulic mining in the mid-1800s caused river beds to rise
- Levees were consequently privately constructed in late 1800s and early 1900s to combat primarily overtopping
- Levees were improved and incorporated under the Sacramento River Flood Control Project by USACE in early 1900s

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A Brief Local History (cont.)

- Oroville Dam and Reservoir were completed in 1967, adding substantial flood storage
- New Bullards Bar Dam and Reservoir completed in 1970, adding substantial flood storage
- Flood risk is still present, with major events
- In 1955, breach on Feather River near Shanghai Bend (38 people killed)
- In 1986, break on Yuba River and slump on Sutter Bypass
- In 1997, breaches on Feather River and Sutter Bypass

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Recent Flood Management Efforts

- Levee evaluation studies by USACE, DWR, and SBFCA have documented deficiencies in the system
- In 2010, property owners of Sutter and Butte Counties approved the formation of an assessment district to provide local funds for flood risk management

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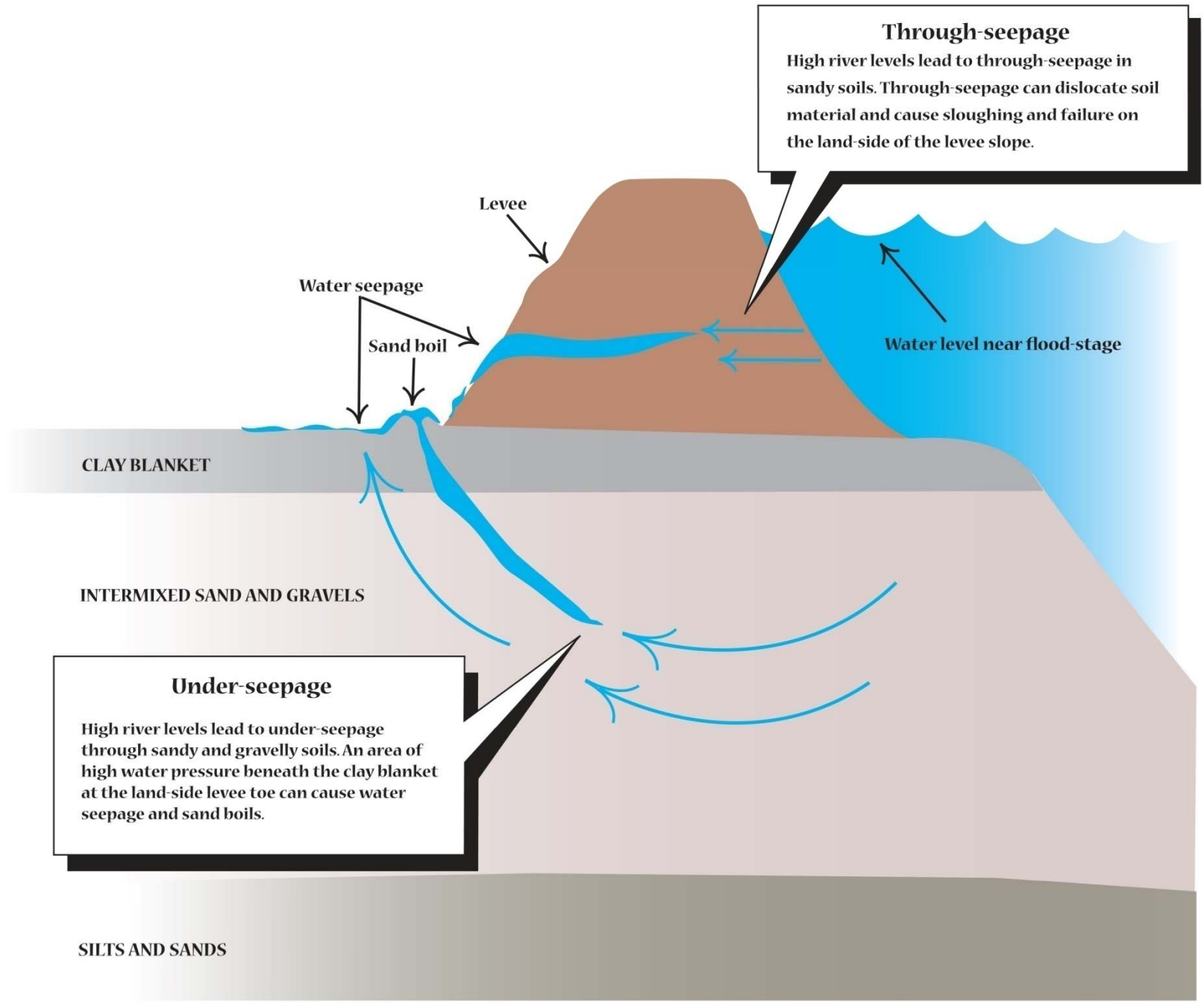
Through-seepage
High river levels lead to through-seepage in sandy soils. Through-seepage can dislocate soil material and cause sloughing and failure on the land-side of the levee slope.
Levee
Water seepage
Sand boil
Water level near flood-stage
CLAY BLANKET
INTERMIXED SAND AND GRAVELS
Under-seepage
High river levels lead to under-seepage through sandy and gravelly soils. An area of high water pressure beneath the clay blanket at the land-side levee toe can cause water seepage and sand boils.
SILTS AND SANDS

A Closer Look at Each Project

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Sutter Basin Project Feasibility Study: Study Area

- Study area encompasses ~284 sq. miles and is nearly encircled by Federal Project levees
- Includes portions of Sutter and Butte Counties
- About 44 miles long and 9 miles wide
- Feather River to the east and the Cherokee Canal, Wadsworth Canal, Sutter Buttes, and Sutter Bypass to the west

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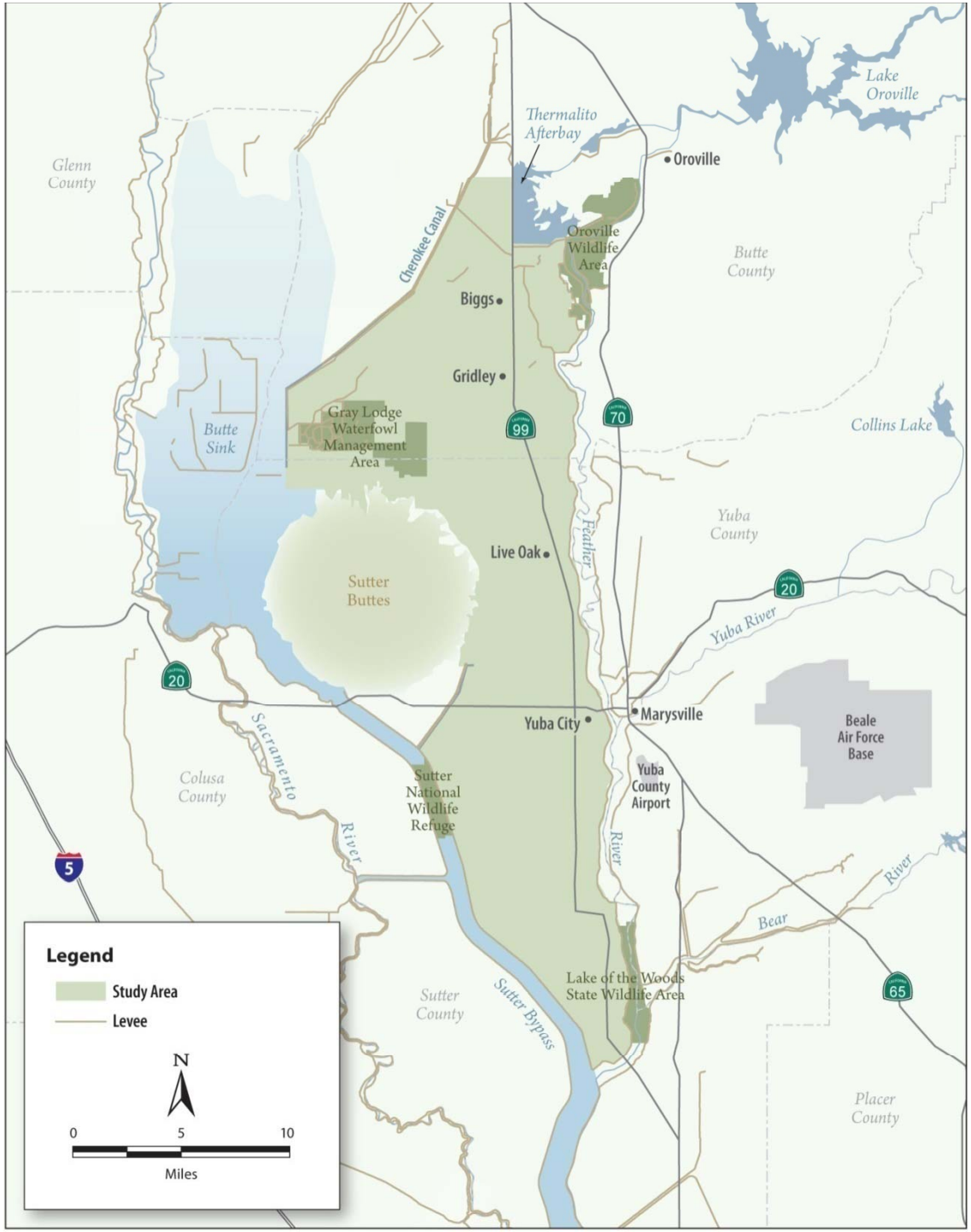
Sutter Basin Project Study Area



Sutter Basin Project Feasibility Study: Problems and Potential Measures

- Levees are at risk due to under- and through-seepage and overtopping
- Study will evaluate measures including: re-operation of reservoirs, improvements to existing levees, building new levees, and other storage & conveyance options
- Ecosystem restoration would include restoration of floodplain function and habitat

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Sutter Basin Project Feasibility Study: Potential Alternatives & Funding

- Potential alternatives include those that comprise flood risk management, ecosystem restoration, and recreation measures
- Funding for the feasibility study phase only is cost-shared, 50% Federal (USACE) and 50% non-Federal (SBFCA and CVFPB)

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Feather River West Levee Project: Study Area

- Will improve 44-miles of levees from the Thermalito Afterbay to the Sutter Bypass
- Provides flood risk management benefits to Live Oak, Biggs, Gridley, and Yuba City and unincorporated areas

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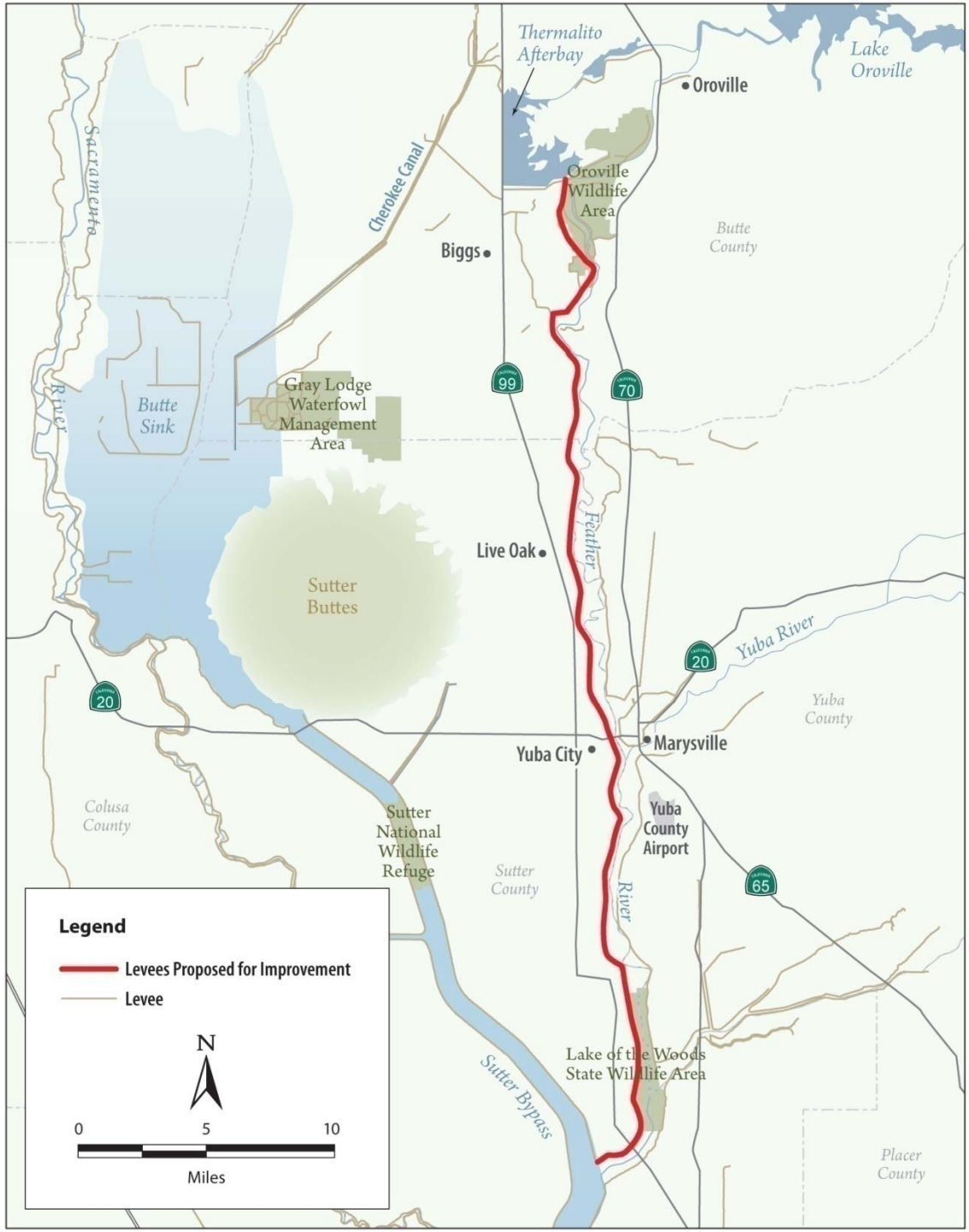
Feather River West Levee Project Study Area



Feather River West Levee Project: Problems and Potential Measures

- Primary deficiencies include through-seepage and under-seepage
- Measures may include slurry walls, seepage berms, stability berms, internal drains, relief wells, sheet-pile walls, slope flattening, and new levee alignments

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Feather River West Levee Project: Funding

- The project cost is estimated at $300 million
- The state is expected to pay as much as 76% of project costs
- Locals (within assessment district) will pay the remaining share through annual assessment (anticipated to be in effect for 33 years)

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THE ENVIRONMENTAL PROCESS

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NEPA & CEQA

- NEPA (Federal) and CEQA (state) are both processes that require:
  - Analysis and disclosure of an activity's potential effect on the natural and built environments
  - Identification of alternatives and mitigation measures to reduce effects
- Processes may necessitate an EIS and EIR depending on potential effects (type and degree)

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JOINT EIS/EIR

- Prepared when there is both a Federal and state agency interest in an activity, and/or
- When a state lead agency needs permission to perform an action under Federal jurisdiction (Section 408 permission & Section 404 permit)
- Agencies partner to analyze effects in a joint EIS/EIR and disclose an activity's potential effects

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WHAT IS *SCOPING*?

- Scoping is a process used to inform the public of the proposed activity and provide an opportunity to give input on the range of alternatives, potential environmental effects, and any issues of concern related to the proposed activity

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SCOPING PERIOD

- May 20, 2011 to July 8, 2011
- Comments will be accepted via e-mail, fax, and USPS
- Comments must be postmarked, faxed, or time-stamped (email) before or on July 8, 2011

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Ways to Comment

- Via E-mail
- Facsimile
- Via U.S. Postal Service
- Today via written comment (see comment cards)
- Provide oral comments to court reporter

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Sacramento District

CONTACT INFORMATION

Mail or E-mail comments to:

Matt Davis
U.S Army Corps of Engineers
1325 J Street
Sacramento, CA 95814

Phone: 916-557-6708
Fax: 916-557-7856

Matthew.G.Davis@usace. army.mil

Ingrid Norgaard
Sutter Butte Flood Control Agency
c/o ICF International
630 K Street, Suite 400
Sacramento, CA 95814

Phone: 916-737-3000
Fax: 916-737-3030

inorgaard@icfi.com

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THANK YOU FOR ATTENDING

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Coordinated Environmental Analysis

It is anticipated the Sutter Basin Project and FRWLP will result in two separate environmental impact statements/environmental impact reports (EIS/EIR)—one for each project. Both documents will disclose alternatives, potential effects, and proposed mitigation measures in compliance with the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA), respectively. A joint EIS/EIR is prepared when there is both a Federal and state agency interest in an activity, and/or when a state agency needs permission to perform an action under Federal jurisdiction.

Development of the draft EIS/EIR to evaluate the FRWLP is underway and scheduled for public release in early 2012. A public release date for the Sutter Basin Project draft EIS/EIR has yet to be determined.

The Scoping Process

USACE and SBFCA are working together to combine and coordinate this public scoping process for their two separate environmental documents.

Scoping is a process in which agencies inform the public of a proposed activity and provide an opportunity for public input on the range of alternatives, environmental effects, and issues of concern related to the proposed activity. It also allows agencies to gather insights and local information from the public related to the activity.

Comments received from this public scoping period will be used to inform development of the alternatives; define the environment and resources potentially affected by the alternatives; and analyze effects resulting from the alternatives. The affected environment broadly includes physical, biological, and social topic areas. Effects will be identified and analyzed both for project construction and long-term operations and maintenance. The scoping period is from May 20, 2011 to July 8, 2011.

For more information on these efforts, visit www.spk.usace.army.mil or www.sutterbutteflood.org.

6/23/11

Sutter Basin Project and Feather River West Levee Project

The U.S. Army Corps of Engineers (USACE) and the Sutter Butte Flood Control Agency (SBFCA), in coordination with the California Department of Water Resources (DWR) and the California Central Valley Flood Protection Board (CVFPB), are undertaking two related efforts to study flood risk management measures in Sutter and Butte Counties. USACE is leading a feasibility study for the Sutter Basin Project to determine Federal interest in flood risk management in conjunction with other related purposes in the Sutter Basin study area, while SBFCA is leading the Feather River West Levee Project (FRWLP) to address deficiencies in 44 miles along the west levee of the Feather River.

USACE and SBFCA are studying these two projects in close coordination because they are related in their study areas, purpose, potential measures, and potential effects.

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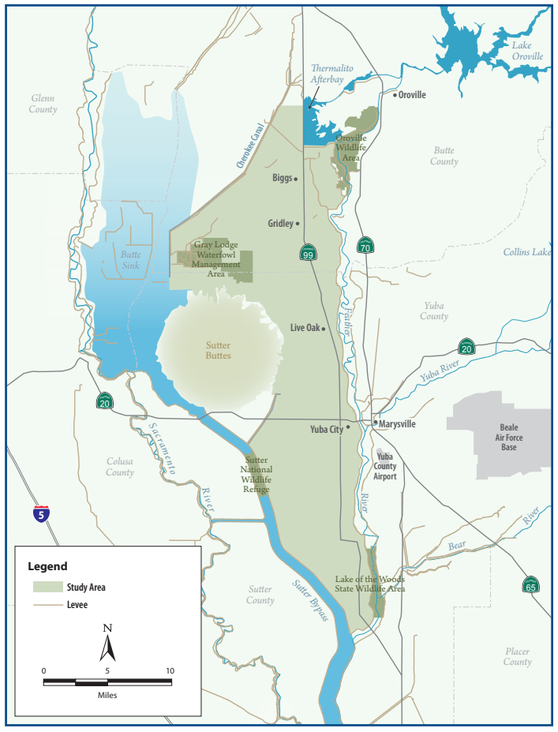
A Closer Look at the Two Projects

The Sutter Basin Project Feasibility Study

In 2000, the State of California and USACE entered into a cost-sharing agreement to initiate a feasibility study within the Sutter Basin. An amendment of the cost-sharing agreement was signed in July 2010 to include SBFCA as a non-Federal sponsor. The purpose of the feasibility study is to address flood risk management, ecosystem restoration, and recreation issues in the study area.

The Sutter Basin Project feasibility study evaluates approximately 285 square miles that are roughly bounded by the Feather River, Sutter Bypass, Wadsworth Canal, Sutter Buttes, and Cherokee Canal. The study area is essentially encircled by project levees and the high ground of the Sutter Buttes. Past flood events and geotechnical analysis show these levees have a higher probability of failure related to through-and under-seepage than levees designed to meet current standards. Additionally, the levees are at risk of overtopping from floods greater than they are designed to withstand.

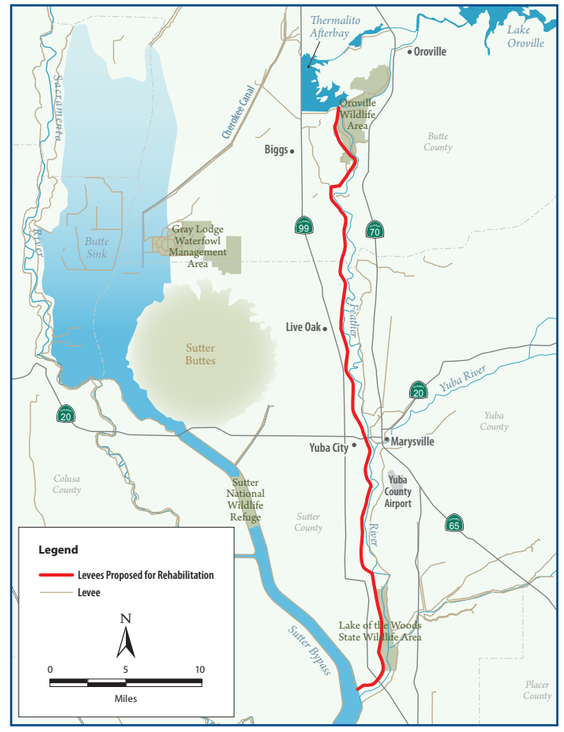


As part of the Sutter Basin Project feasibility study, USACE is evaluating a variety of flood risk management measures that could include re-operation of reservoirs; improvements to existing levees; construction of new levees; other storage, conveyance, and non-structural options; and measures that could potentially restore the ecosystem within the study area and develop or expand recreation facilities. This study will be the basis for a recommendation to Congress to address water resources and related issues within the study area. The feasibility study phase of this project is cost-shared: USACE will fund 50%, and SBFCA and the State of California will fund the remaining 50%.

The Feather River West Levee Project

SBFCA is planning the FRWLP to address levee deficiencies found along 44 miles of the Feather River's west levee from the Thermalito Afterbay south to the Sutter Bypass. The west levee provides flood risk management benefits to the cities of Yuba City, Gridley, Live Oak, and Biggs, and portions of Butte and Sutter Counties. Measures are being evaluated to meet Federal, state, and local flood protection criteria and goals.

The west levee is at risk of failure from through- and under-seepage and from overtopping caused by floods greater than the levee is designed to withstand. Alternatives to repair these deficiencies could include slurry walls, seepage berms, stability berms, internal drains, relief wells, sheet-pile walls, slope flattening, and new levee alignments. The goal is to construct the FRWLP as quickly as possible, in advance of and compatible with the Sutter Basin Project, potentially in 2013.



Environmental Review Process Timeline for the Sutter Basin Project and FRWLP

Spring 2011 - Fall 2011
Release Notice of Intent (NEPA) and Notice of Preparation (CEQA) to announce the development of an EIS/EIR
Conduct public scoping to inform the public of and solicit input about the proposed activity

Fall 2011 - Spring 2012
Prepare Draft Integrated Feasibility Report & EIS/EIR (FREIS/EIR)

Spring 2012 - Fall 2012
Draft FREIS/EIR 45-day Public Review
Final FREIS/EIR 30-day Public Review

Winter 2012 - Spring 2013
A Record of Decision (NEPA) and Notice of Determination (CEQA) will document selected alternative

2011 | 2012 | 2013

May 2011
Notice of Intent and Notice of Preparation are released to announce start of the environmental review process

May - July 2011
Conduct public scoping to inform the public of and solicit input about the proposed activity

January 2012
FRWLP Draft EIS/EIR released for public comment

Summer 2012
FRWLP Final EIS/EIR released

Legend
Sutter Basin Project
Feather River West Levee Project

Sutter Basin Project & Feather River West Levee Project

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Sacramento District

June 27, 2011 Scoping Meeting Comment Card

Date:_____

Name:_____Title:_____

Phone:_____Fax:_____Affiliation:_____

Email:_____Street Address_____

City:_____State:_____Zip:_____

☐ Please add me to the mailing list to receive future updates.

Thank you for attending the Sutter Basin Project and Feather River West Levee Project (FRWLP) scoping meeting. Please provide your input in the space below about the content of the environmental impact statement/environmental impact report (EIS/EIR) for the Sutter Basin Project and/or for the EIS/EIR for the FRWLP. After you've written your comments in the space below, place this card in one of the designated baskets around the room or hand it to a project team member. Please write legibly.

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Sutter Basin Project & Feather River West Levee Project

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Sacramento District

June 28, 2011 Scoping Meeting Comment Card

Date:_____

Name:_____Title:_____

Phone:_____Fax:_____Affiliation:_____

Email:_____Street Address_____

City:_____State:_____Zip:_____

☐ Please add me to the mailing list to receive future updates.

Thank you for attending the Sutter Basin Project and Feather River West Levee Project (FRWLP) scoping meeting. Please provide your input in the space below about the content of the environmental impact statement/environmental impact report (EIS/EIR) for the Sutter Basin Project and/or for the EIS/EIR for the FRWLP. After you've written your comments in the space below, place this card in one of the designated baskets around the room or hand it to a project team member. Please write legibly.

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Attachment C

- Comments received from all interested parties (including those transcribed by court reporter)
- Attendee sign-in sheet templates

Sutter Basin Project & Feather River West Levee Project

US Army Corps of Engineers
Sacramento District

June 27, 2011 Scoping Meeting Comment Card

Date: 6/27/11

Name: Douglas Gault Title: Director of Public Works, Sutter County

Phone: Fax: Affiliation:

Email: Street Address

City: State: Zip:

☐ Please add me to the mailing list to receive future updates.

Thank you for attending the Sutter Basin Project and Feather River West Levee Project (FRWLP) scoping meeting. Please provide your input in the space below about the content of the environmental impact statement/environmental impact report (EIS/EIR) for the Sutter Basin Project and/or for the EIS/EIR for the FRWLP. After you've written your comments in the space below, place this card in one of the designated baskets around the room or hand it to a project team member. Please write legibly.

Meet Spring 2013 ~~Scheduled~~ completion. of USACE Feasibility study. Do not delay. 104 certification must be issued at that time to allow state to releare EIP funding for West Levee Project.

Keep the process for feasibility study on schedule.

ORIGINAL

SUTTER BASIN PROJECT FEASIBILITY STUDY & FEATHER RIVER WEST LEVEE PROJECT PUBLIC SCOPING MEETING û YUBA CITY, CA

DATE: June 27, 2011

TIME: 3:30 p.m. and 6:30 p.m.

REPORTED BY: Jillian Bassett
Certified Shorthand Reporter No. 13619

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nccr@norcalreporters.com ■ www.norcalreporters.com

STAN CLEVELAND, COUNTY SUPERVISOR:

I was told to repeat the comment I made regarding including the DWR Corridor Management Project, which is called The Lower Feather River Corridor Management Project. And there's a management group, and then there's -- I forgot what the other one is; there's two groups. And Aecom, they're the project, I guess, engineer group for that. And making sure that that is coordinated with this here. Because in that corridor of the Feather River, they're doing a lot of environmental planning and setting a foundation, or a level base, to where everybody won't have to come back and start from scratch on any of their studies -- environmental studies.

Certificate

of

Certified Shorthand Reporter

The undersigned certified shorthand reporter of the state of California does hereby certify:

That the foregoing deposition was taken before me at the time and place therein set forth, at which time the witness was duly sworn by me;

That the testimony of the witness and all objections made at the time of the examination were recorded stenographically by me and thereafter transcribed, said transcript being a true copy of my shorthand notes thereof.

In witness whereof, I have subscribed my name this date July 25 2011.

Jill Bessett

Certificate number 13019

ORIGINAL

SUTTER BASIN PROJECT FEASIBILITY STUDY & FEATHER RIVER WEST LEVEE PROJECT PUBLIC SCOPING MEETING û GRIDLEY, CA

DATE: June 28, 2011

TIME: 3:30 p.m. and 6:30 p.m.

REPORTED BY: Jillian Bassett
Certified Shorthand Reporter No. 13619

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Northern California Court Reporters
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(916) 485-4949 ■ Fax (916) 485-1323 ■ (888) 600-NCCR
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DAVID NEUBERT:

I live in Sutter County. I was speaking with your colleagues, and they mentioned one of the options they're looking at is a levee setback in the area of Nelson slough along Sacramento Avenue in Sutter County. And this would be the area between the Sacramento bypass and the Feather River, right where the Feather River enters the bypass. There's, I don't know, maybe 900,000 acres there that they could sort of cut the corner on the levee the way it exists now, and pick up 1,000 acres of floodplain.

And I'm just -- I think that's a great idea. There's -- I think there might be one house, and it's probably just a rental in that area. So you probably wouldn't have a lot of homeowners that would be hopping mad. And you'd probably pick up 10 or 15,000 acre-feet of flood storage. So it would be something, I think, that would -- engineering-wise, it would be an interesting levee setback to look at.

So the other thing that I think that as a resident of Sutter County, and I live in the LD-1 area -- I'm not sure if LD-1 has the capacity -- management capacity to pull something like that off. You know, maybe setting up something like

trilla (phonetic) like they did in Yuba County. Or maybe this super agency, the Sutter Butte Agency, could do it.

But I just -- I just don't think management capacity, or I should say the planning capacity of the board level -- I think the management, the managers of LD-1 are fine. But the board, I don't think, has vision for projects like this. So hopefully they do.

RICHARD KUCEK:

I guess it goes back to the building of the levee was our first project for the taxpayers to protect everybody from flooding. Okay. They knew after '55 when they finished the levee and had to break in Yuba City, that that wouldn't solve the problem. So they took -- and I wouldn't say they use -- it had scare tactic. But they got the taxpayers to fund another project which was get the dam at Lake Oroville. And the state of California, at that time, from what I understand, did not have enough money to build it. But the taxpayers voted it in, so it went on their tax board. But Southern California funded most of the money for building that in return for surplus water out at the lake.

And somewhere down the line it got turned around that I guess the water's worth more than the people in the houses. So they keep the lake elevation too high. But if they would keep it down, we would never need these projects that they're proposing today, which would be the third ones the taxpayers are going to pay for just for protection.

And like, the slurry would be the right way to fix this right now. If they went with the berm, that would cause a lot of problems, because there would be

maintenance, and they can't maintain the levees that there are right now. You can go out there and look at it; kids drive up and down on it, there's gophers and squirrels on it and everything else. And they don't spray it. They don't kill the weeds. They don't do nothing. So if they do, I guess that setback levee, that wouldn't cause a lot more problems on the east side of it, and then what do you do with that? Because you got to be in the floodplain. But the berm, to me, would be too expensive to keep in 33 years.

So I don't know how they got as far as they did with this project. But it should never happen because the taxpayers shouldn't have to pay three times for flood protection.

So I don't know. I guess we'll just go to the meetings and see how it comes out and, you know, if they're going to do all this, and Southern California has the right to all that water, why don't they pay the bills? I mean, why should we have to pay it? If they want to keep that lake full enough so it enables us from flooding, they should have to pay the bill if it does flood. Not raise our taxes and everything else, and our flood insurance, and they get all the water, and we got the bill.

BOB BARKHOUSE:

Two concerns I have is the east levee of the Sutter bypass, because, in my lifetime, on the west side -- I've had to live through two floods -- farmland on the other side -- major floods. Those levees on the west side -- east side are no better than west side, yet we're trying to contain the overflow from the Sacramento River between bypass. And we certainly are subject to flooding if the right condition --

And then my second concern was the maps continuously show a perimeter levee around Yuba City, or a J levee on the south and west side. And I'm concerned about building a levee around Yuba City and putting the city of Yuba City in the same parallel as the city of Marysville. Although Marysville has never flooded, but it's always -- the bowl is likely to fill up someday, and it would be a catastrophe.

But I am concerned about that part. They have a strong levee on the Feather River, and let that take care of itself. So that was my two concerns.

Certificate

of

Certified Shorthand Reporter

The undersigned certified shorthand reporter of the state of California does hereby certify:

That the foregoing deposition was taken before me at the time and place therein set forth, at which time the witness was duly sworn by me;

That the testimony of the witness and all objections made at the time of the examination were recorded stenographically by me and thereafter transcribed, said transcript being a true copy of my shorthand notes thereof.

In witness whereof, I have subscribed my name this date July 25 2011.

Jill Bassett

Certificate number 13019

Sutter Basin Project & Feather River West Levee Project

June 27, 2011 Scoping Meeting

Sign-in Sheet

US Army Corps of Engineers®
Sacramento District

Name	Title	Affiliation	Street Address	City	Zip Code	How did you hear about the meeting?

Sutter Basin Project & Feather River West Levee Project

June 28, 2011 Scoping Meeting

Sign-in Sheet

US Army Corps of Engineers®
Sacramento District

Name	Title	Affiliation	Street Address	City	Zip Code	How did you hear about the meeting?

Road Construction Emissions Model, Version 6.3.2

Emission Estimates for -> Contract A Project Phases (English Units)	ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	Total PM10 (lbs/day)	Exhaust PM10 (lbs/day)	Fugitive Dust PM10 (lbs/day)	Total PM2.5 (lbs/day)	Exhaust PM2.5 (lbs/day)	Fugitive Dust PM2.5 (lbs/day)	CO2 (lbs/day)
Grubbing/Land Clearing	14.3	80.4	117.7	9.7	4.7	5.0	5.1	4.1	1.0	19,633.2
Grading/Excavation	53.2	321.2	419.5	20.8	15.8	5.0	15.0	13.9	1.0	67,500.9
Drainage/Utilities/Sub-Grade	11.8	67.9	93.9	9.0	4.0	5.0	4.5	3.5	1.0	16,672.6
Paving	9.3	57.0	70.6	3.3	3.3	-	2.8	2.8	-	13,616.9
Maximum (pounds/day)	53.2	321.2	419.5	20.8	15.8	5.0	15.0	13.9	1.0	67,500.9
Total (tons/construction project)	1.9	11.2	14.7	0.9	0.6	0.3	0.6	0.5	0.1	2,434.8

Notes:

Project Start Year ->	2013
Project Length (months) ->	6
Total Project Area (acres) ->	183
Maximum Area Disturbed/Day (acres) ->	1
Total Soil Imported/Exported (yd^3/day)->	3054

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.

Emission Estimates for -> Contract A Project Phases (Metric Units)	ROG (kgs/day)	CO (kgs/day)	NOx (kgs/day)	Total PM10 (kgs/day)	Exhaust PM10 (kgs/day)	Fugitive Dust PM10 (kgs/day)	Total PM2.5 (kgs/day)	Exhaust PM2.5 (kgs/day)	Fugitive Dust PM2.5 (kgs/day)	CO2 (kgs/day)
Grubbing/Land Clearing	6.5	36.5	53.5	4.4	2.1	2.3	2.3	1.9	0.5	8,924.2
Grading/Excavation	24.2	146.0	190.7	9.5	7.2	2.3	6.8	6.3	0.5	30,682.2
Drainage/Utilities/Sub-Grade	5.4	30.8	42.7	4.1	1.8	2.3	2.1	1.6	0.5	7,578.5
Paving	4.2	25.9	32.1	1.5	1.5	-	1.3	1.3	-	6,189.5
Maximum (kilograms/day)	24.2	146.0	190.7	9.5	7.2	2.3	6.8	6.3	0.5	30,682.2
Total (megagrams/construction project)	1.7	10.1	13.4	0.8	0.5	0.3	0.5	0.5	0.1	2,208.5

Notes:

Project Start Year ->	2013
Project Length (months) ->	6
Total Project Area (hectares) ->	74
Maximum Area Disturbed/Day (hectares) ->	0
Total Soil Imported/Exported ($meters^3$/day)->	2335

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sume of exhaust and fugitive dust emissions shown in columns K and L.

Road Construction Emissions Model, Version 6.3.2

Emission Estimates for -> Contract B Project Phases (English Units)	ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	Total PM10 (lbs/day)	Exhaust PM10 (lbs/day)	Fugitive Dust PM10 (lbs/day)	Total PM2.5 (lbs/day)	Exhaust PM2.5 (lbs/day)	Fugitive Dust PM2.5 (lbs/day)	CO2 (lbs/day)
Grubbing/Land Clearing	13.3	74.9	107.5	9.3	4.3	5.0	4.8	3.7	1.0	19,516.4
Grading/Excavation	49.2	289.3	372.3	19.1	14.1	5.0	13.4	12.4	1.0	66,559.2
Drainage/Utilities/Sub-Grade	10.9	63.1	85.5	8.7	3.7	5.0	4.2	3.2	1.0	16,555.8
Paving	8.5	52.8	64.3	3.0	3.0	-	2.5	2.5	-	13,462.0
Maximum (pounds/day)	49.2	289.3	372.3	19.1	14.1	5.0	13.4	12.4	1.0	66,559.2
Total (tons/construction project)	1.7	10.1	13.2	0.8	0.5	0.3	0.5	0.5	0.1	2,405.0

Notes:

Project Start Year ->	2014
Project Length (months) ->	6
Total Project Area (acres) ->	272
Maximum Area Disturbed/Day (acres) ->	1
Total Soil Imported/Exported (yd^3/day)->	2925

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.

Emission Estimates for -> Contract B Project Phases (Metric Units)	ROG (kgs/day)	CO (kgs/day)	NOx (kgs/day)	Total PM10 (kgs/day)	Exhaust PM10 (kgs/day)	Fugitive Dust PM10 (kgs/day)	Total PM2.5 (kgs/day)	Exhaust PM2.5 (kgs/day)	Fugitive Dust PM2.5 (kgs/day)	CO2 (kgs/day)
Grubbing/Land Clearing	6.0	34.0	48.9	4.2	2.0	2.3	2.2	1.7	0.5	8,871.1
Grading/Excavation	22.3	131.5	169.2	8.7	6.4	2.3	6.1	5.6	0.5	30,254.2
Drainage/Utilities/Sub-Grade	5.0	28.7	38.9	4.0	1.7	2.3	1.9	1.4	0.5	7,525.4
Paving	3.9	24.0	29.2	1.4	1.4	-	1.2	1.2	-	6,119.1
Maximum (kilograms/day)	22.3	131.5	169.2	8.7	6.4	2.3	6.1	5.6	0.5	30,254.2
Total (megagrams/construction project)	1.6	9.2	11.9	0.7	0.5	0.3	0.5	0.4	0.1	2,181.4

Notes:

Project Start Year ->	2014
Project Length (months) ->	6
Total Project Area (hectares) ->	110
Maximum Area Disturbed/Day (hectares) ->	0
Total Soil Imported/Exported ($meters^3$/day)->	2236

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sume of exhaust and fugitive dust emissions shown in columns K and L.

Road Construction Emissions Model, Version 6.3.2

Emission Estimates for -> Contract C1 Project Phases (English Units)	ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	Total PM10 (lbs/day)	Exhaust PM10 (lbs/day)	Fugitive Dust PM10 (lbs/day)	Total PM2.5 (lbs/day)	Exhaust PM2.5 (lbs/day)	Fugitive Dust PM2.5 (lbs/day)	CO2 (lbs/day)
Grubbing/Land Clearing	12.9	71.4	100.5	9.3	4.3	5.0	4.7	3.7	1.0	19,632.9
Grading/Excavation	41.1	214.6	300.0	16.6	11.6	5.0	11.3	10.2	1.0	59,060.7
Drainage/Utilities/Sub-Grade	10.4	60.2	78.9	8.6	3.6	5.0	4.1	3.1	1.0	16,672.3
Paving	8.1	50.5	59.7	3.0	3.0	-	2.5	2.5	-	13,615.6
Maximum (pounds/day)	41.1	214.6	300.0	16.6	11.6	5.0	11.3	10.2	1.0	59,060.7
Total (tons/construction project)	1.5	8.0	11.0	0.7	0.4	0.3	0.4	0.4	0.1	2,212.0

Notes:

Project Start Year ->	2015
Project Length (months) ->	6
Total Project Area (acres) ->	150
Maximum Area Disturbed/Day (acres) ->	1
Total Soil Imported/Exported (yd^3/day)->	1719

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.

Emission Estimates for -> Contract C1 Project Phases (Metric Units)	ROG (kgs/day)	CO (kgs/day)	NOx (kgs/day)	Total PM10 (kgs/day)	Exhaust PM10 (kgs/day)	Fugitive Dust PM10 (kgs/day)	Total PM2.5 (kgs/day)	Exhaust PM2.5 (kgs/day)	Fugitive Dust PM2.5 (kgs/day)	CO2 (kgs/day)
Grubbing/Land Clearing	5.9	32.5	45.7	4.2	1.9	2.3	2.2	1.7	0.5	8,924.0
Grading/Excavation	18.7	97.5	136.4	7.5	5.3	2.3	5.1	4.6	0.5	26,845.8
Drainage/Utilities/Sub-Grade	4.7	27.4	35.8	3.9	1.6	2.3	1.9	1.4	0.5	7,578.3
Paving	3.7	22.9	27.1	1.3	1.3	-	1.1	1.1	-	6,188.9
Maximum (kilograms/day)	18.7	97.5	136.4	7.5	5.3	2.3	5.1	4.6	0.5	26,845.8
Total (megagrams/construction project)	1.4	7.3	10.0	0.7	0.4	0.3	0.4	0.4	0.1	2,006.3

Notes:

Project Start Year ->	2015
Project Length (months) ->	6
Total Project Area (hectares) ->	61
Maximum Area Disturbed/Day (hectares) ->	0
Total Soil Imported/Exported ($meters^3$/day)->	1314

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sume of exhaust and fugitive dust emissions shown in columns K and L.

Road Construction Emissions Model, Version 6.3.2

Emission Estimates for -> Contract C2 Project Phases (English Units)	ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	Total PM10 (lbs/day)	Exhaust PM10 (lbs/day)	Fugitive Dust PM10 (lbs/day)	Total PM2.5 (lbs/day)	Exhaust PM2.5 (lbs/day)	Fugitive Dust PM2.5 (lbs/day)	CO2 (lbs/day)
Grubbing/Land Clearing	12.1	67.8	93.0	9.0	4.0	5.0	4.4	3.4	1.0	19,631.8
Grading/Excavation	40.1	216.4	279.4	15.8	10.8	5.0	10.5	9.5	1.0	61,466.5
Drainage/Utilities/Sub-Grade	9.8	57.2	73.2	8.3	3.3	5.0	3.9	2.8	1.0	16,671.2
Paving	7.6	47.9	55.9	2.8	2.8	-	2.3	2.3	-	13,614.1
Maximum (pounds/day)	40.1	216.4	279.4	15.8	10.8	5.0	10.5	9.5	1.0	61,466.5
Total (tons/construction project)	1.4	8.0	10.2	0.7	0.4	0.3	0.4	0.4	0.1	2,275.5

Notes:

Project Start Year ->	2016
Project Length (months) ->	6
Total Project Area (acres) ->	105
Maximum Area Disturbed/Day (acres) ->	1
Total Soil Imported/Exported (yd^3/day)->	2095

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.

Emission Estimates for -> Contract C2 Project Phases (Metric Units)	ROG (kgs/day)	CO (kgs/day)	NOx (kgs/day)	Total PM10 (kgs/day)	Exhaust PM10 (kgs/day)	Fugitive Dust PM10 (kgs/day)	Total PM2.5 (kgs/day)	Exhaust PM2.5 (kgs/day)	Fugitive Dust PM2.5 (kgs/day)	CO2 (kgs/day)
Grubbing/Land Clearing	5.5	30.8	42.3	4.1	1.8	2.3	2.0	1.5	0.5	8,923.5
Grading/Excavation	18.2	98.3	127.0	7.2	4.9	2.3	4.8	4.3	0.5	27,939.3
Drainage/Utilities/Sub-Grade	4.5	26.0	33.3	3.8	1.5	2.3	1.8	1.3	0.5	7,577.8
Paving	3.5	21.8	25.4	1.3	1.3	-	1.1	1.1	-	6,188.2
Maximum (kilograms/day)	18.2	98.3	127.0	7.2	4.9	2.3	4.8	4.3	0.5	27,939.3
Total (megagrams/construction project)	1.3	7.2	9.3	0.6	0.4	0.3	0.4	0.3	0.1	2,063.9

Notes:

Project Start Year ->	2016
Project Length (months) ->	6
Total Project Area (hectares) ->	42
Maximum Area Disturbed/Day (hectares) ->	0
Total Soil Imported/Exported ($meters^3$/day)->	1602

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sume of exhaust and fugitive dust emissions shown in columns K and L.

Road Construction Emissions Model, Version 6.3.2

Emission Estimates for -> Contract D1 Project Phases (English Units)	ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	Total PM10 (lbs/day)	Exhaust PM10 (lbs/day)	Fugitive Dust PM10 (lbs/day)	Total PM2.5 (lbs/day)	Exhaust PM2.5 (lbs/day)	Fugitive Dust PM2.5 (lbs/day)	CO2 (lbs/day)
Grubbing/Land Clearing	11.4	64.5	85.9	8.7	3.7	5.0	4.2	3.1	1.0	19,630.5
Grading/Excavation	36.3	185.7	247.0	14.7	9.7	5.0	9.5	8.4	1.0	60,502.7
Drainage/Utilities/Sub-Grade	9.2	54.4	67.8	8.1	3.1	5.0	3.7	2.6	1.0	16,670.0
Paving	7.2	45.4	52.3	2.6	2.6	-	2.2	2.2	-	13,612.6
Maximum (pounds/day)	36.3	185.7	247.0	14.7	9.7	5.0	9.5	8.4	1.0	60,502.7
Total (tons/construction project)	1.3	7.0	9.2	0.7	0.4	0.3	0.4	0.3	0.1	2,250.0

Notes:

Project Start Year ->	2017
Project Length (months) ->	6
Total Project Area (acres) ->	160
Maximum Area Disturbed/Day (acres) ->	1
Total Soil Imported/Exported (yd^3/day)->	1460

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.

Emission Estimates for -> Contract D1 Project Phases (Metric Units)	ROG (kgs/day)	CO (kgs/day)	NOx (kgs/day)	Total PM10 (kgs/day)	Exhaust PM10 (kgs/day)	Fugitive Dust PM10 (kgs/day)	Total PM2.5 (kgs/day)	Exhaust PM2.5 (kgs/day)	Fugitive Dust PM2.5 (kgs/day)	CO2 (kgs/day)
Grubbing/Land Clearing	5.2	29.3	39.0	3.9	1.7	2.3	1.9	1.4	0.5	8,923.0
Grading/Excavation	16.5	84.4	112.3	6.7	4.4	2.3	4.3	3.8	0.5	27,501.2
Drainage/Utilities/Sub-Grade	4.2	24.7	30.8	3.7	1.4	2.3	1.7	1.2	0.5	7,577.3
Paving	3.3	20.7	23.8	1.2	1.2	-	1.0	1.0	-	6,187.5
Maximum (kilograms/day)	16.5	84.4	112.3	6.7	4.4	2.3	4.3	3.8	0.5	27,501.2
Total (megagrams/construction project)	1.2	6.4	8.3	0.6	0.3	0.3	0.3	0.3	0.1	2,040.8

Notes:

Project Start Year ->	2017
Project Length (months) ->	6
Total Project Area (hectares) ->	65
Maximum Area Disturbed/Day (hectares) ->	0
Total Soil Imported/Exported ($meters^3$/day)->	1116

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sume of exhaust and fugitive dust emissions shown in columns K and L.

Road Construction Emissions Model, Version 6.3.2

Emission Estimates for -> Contract D2 Project Phases (English Units)	ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	Total PM10 (lbs/day)	Exhaust PM10 (lbs/day)	Fugitive Dust PM10 (lbs/day)	Total PM2.5 (lbs/day)	Exhaust PM2.5 (lbs/day)	Fugitive Dust PM2.5 (lbs/day)	CO2 (lbs/day)
Grubbing/Land Clearing	11.4	64.5	85.9	8.7	3.7	5.0	4.2	3.1	1.0	19,630.5
Grading/Excavation	34.9	180.5	229.8	14.0	9.0	5.0	8.9	7.9	1.0	55,338.2
Drainage/Utilities/Sub-Grade	9.2	54.4	67.8	8.1	3.1	5.0	3.7	2.6	1.0	16,670.0
Paving	7.2	45.4	52.3	2.6	2.6	-	2.2	2.2	-	13,612.6
Maximum (pounds/day)	34.9	180.5	229.8	14.0	9.0	5.0	8.9	7.9	1.0	55,338.2
Total (tons/construction project)	1.3	6.9	8.7	0.6	0.4	0.3	0.4	0.3	0.1	2,113.6

Notes:

Project Start Year ->	2017
Project Length (months) ->	6
Total Project Area (acres) ->	90
Maximum Area Disturbed/Day (acres) ->	1
Total Soil Imported/Exported (yd^3/day)->	1601

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.

Emission Estimates for -> Contract D2 Project Phases (Metric Units)	ROG (kgs/day)	CO (kgs/day)	NOx (kgs/day)	Total PM10 (kgs/day)	Exhaust PM10 (kgs/day)	Fugitive Dust PM10 (kgs/day)	Total PM2.5 (kgs/day)	Exhaust PM2.5 (kgs/day)	Fugitive Dust PM2.5 (kgs/day)	CO2 (kgs/day)
Grubbing/Land Clearing	5.2	29.3	39.0	3.9	1.7	2.3	1.9	1.4	0.5	8,923.0
Grading/Excavation	15.9	82.1	104.5	6.3	4.1	2.3	4.0	3.6	0.5	25,153.7
Drainage/Utilities/Sub-Grade	4.2	24.7	30.8	3.7	1.4	2.3	1.7	1.2	0.5	7,577.3
Paving	3.3	20.7	23.8	1.2	1.2	-	1.0	1.0	-	6,187.5
Maximum (kilograms/day)	15.9	82.1	104.5	6.3	4.1	2.3	4.0	3.6	0.5	25,153.7
Total (megagrams/construction project)	1.2	6.3	7.9	0.6	0.3	0.3	0.3	0.3	0.1	1,917.1

Notes:

Project Start Year ->	2017
Project Length (months) ->	6
Total Project Area (hectares) ->	36
Maximum Area Disturbed/Day (hectares) ->	0
Total Soil Imported/Exported ($meters^3$/day)->	1224

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sume of exhaust and fugitive dust emissions shown in columns K and L.

U.S. Fish & Wildlife Service
Sacramento Fish & Wildlife Office

Federal Endangered and Threatened Species that Occur in or may be Affected by Projects in the Counties and/or U.S.G.S. 7 1/2 Minute Quads you requested

Document Number: 130213053142

Database Last Updated: September 18, 2011

No quad species lists requested.

County Lists

Butte County

Listed Species

Invertebrates

Branchinecta conservatio
- Conservancy fairy shrimp (E)
- Critical habitat, Conservancy fairy shrimp (X)

Branchinecta lynchi
- Critical habitat, vernal pool fairy shrimp (X)
- vernal pool fairy shrimp (T)

Desmocerus californicus dimorphus
- valley elderberry longhorn beetle (T)

Lepidurus packardi
- Critical habitat, vernal pool tadpole shrimp (X)
- vernal pool tadpole shrimp (E)

Fish

Acipenser medirostris
- green sturgeon (T) (NMFS)

Hypomesus transpacificus
- delta smelt (T)

Oncorhynchus mykiss
- Central Valley steelhead (T) (NMFS)
- Critical habitat, Central Valley steelhead (X) (NMFS)

Oncorhynchus tshawytscha
- Central Valley spring-run chinook salmon (T) (NMFS)
- Critical Habitat, Central Valley spring-run chinook (X) (NMFS)
- Critical habitat, winter-run chinook salmon (X) (NMFS)

winter-run chinook salmon, Sacramento River (E) (NMFS)

Amphibians

Ambystoma californiense
California tiger salamander, central population (T)

Rana draytonii
California red-legged frog (T)
Critical habitat, California red-legged frog (X)

Reptiles

Thamnophis gigas
giant garter snake (T)

Plants

Chamaesyce hooveri
Critical habitat, Hoover's spurge (X)
Hoover's spurge (T)

Limnanthes floccosa ssp. californica
Butte County (Shippee) meadowfoam (E)
Critical habitat, Butte County (Shippee) meadowfoam (X)

Orcuttia pilosa
Critical habitat, hairy Orcutt grass (X)
hairy Orcutt grass (E)

Orcuttia tenuis
Critical habitat, slender Orcutt grass (X)
slender Orcutt grass (T)

Senecio layneae
Layne's butterweed (=ragwort) (T)

Tuctoria greenei
Critical habitat, Greene's tuctoria (=Orcutt grass) (X)
Greene's tuctoria (=Orcutt grass) (E)

Candidate Species

Amphibians

Rana muscosa
mountain yellow-legged frog (C)

Birds

Coccyzus americanus occidentalis

Western yellow-billed cuckoo (C)

Mammals

Martes pennanti
fisher (C)

Key:

(E) *Endangered* - Listed as being in danger of extinction.

(T) *Threatened* - Listed as likely to become endangered within the foreseeable future.

(P) *Proposed* - Officially proposed in the Federal Register for listing as endangered or threatened.

(NMFS) Species under the Jurisdiction of the National Oceanic & Atmospheric Administration Fisheries Service. Consult with them directly about these species.

Critical Habitat - Area essential to the conservation of a species.

(PX) *Proposed Critical Habitat* - The species is already listed. Critical habitat is being proposed for it.

(C) *Candidate* - Candidate to become a proposed species.

(V) Vacated by a court order. Not currently in effect. Being reviewed by the Service.

(X) *Critical Habitat* designated for this species

Important Information About Your Species List

How We Make Species Lists

We store information about endangered and threatened species lists by U.S. Geological Survey 7½ minute quads. The United States is divided into these quads, which are about the size of San Francisco.

The animals on your species list are ones that occur within, **or may be affected by** projects within, the quads covered by the list.

- Fish and other aquatic species appear on your list if they are in the same watershed as your quad or if water use in your quad might affect them.
- Amphibians will be on the list for a quad or county if pesticides applied in that area may be carried to their habitat by air currents.
- Birds are shown regardless of whether they are resident or migratory. Relevant birds on the county list should be considered regardless of whether they appear on a quad list.

Plants

Any plants on your list are ones that have actually been observed in the area covered by the list. Plants may exist in an area without ever having been detected there. You can find out what's in the surrounding quads through the California Native Plant Society's online Inventory of Rare and Endangered Plants.

Surveying

Some of the species on your list may not be affected by your project. A trained biologist and/or botanist, familiar with the habitat requirements of the species on your list, should determine whether they or habitats suitable for them may be affected by your project. We recommend that your surveys include any proposed and candidate species on your list. See our Protocol and Recovery Permits pages.

For plant surveys, we recommend using the Guidelines for Conducting and Reporting

was listed before the end of your project.

Species of Concern

The Sacramento Fish & Wildlife Office no longer maintains a list of species of concern. However, various other agencies and organizations maintain lists of at-risk species. These lists provide essential information for land management planning and conservation efforts. More info

Wetlands

If your project will impact wetlands, riparian habitat, or other jurisdictional waters as defined by section 404 of the Clean Water Act and/or section 10 of the Rivers and Harbors Act, you will need to obtain a permit from the U.S. Army Corps of Engineers. Impacts to wetland habitats require site specific mitigation and monitoring. For questions regarding wetlands, please contact Mark Littlefield of this office at (916) 414-6520.

Updates

Our database is constantly updated as species are proposed, listed and delisted. If you address proposed and candidate species in your planning, this should not be a problem. However, we recommend that you get an updated list every 90 days. That would be May 14, 2013.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825-1846

In Reply Refer To
08ESMF00-2013-CPA-0012

MAY 08 2013

Alicia E. Kirchner
Chief, Planning Division
Corps of Engineers, Sacramento District
1325 J Street
Sacramento, California 95825-2922

Dear Ms. Kirchner:

The U.S. Army Corps of Engineers has requested coordination under the Fish and Wildlife Coordination Act (FWCA) for the Sutter Basin Feasibility Study and the Feather River West Levee Project. The proposed levee modifications would occur on the west levee of the Feather River, in Sutter and Butte Counties, California. This report has been prepared under the authority of, and in accordance with, the provisions of section 2(b) of the FWCA (48 stat.401, as amended; 16 U.S.C. 661 et seq.).

By copy of this letter, this report is being circulated to the agencies and offices listed below for review and comment. We would appreciate receipt of any comments on this report within 30 days of receipt of this report.

If you have any questions regarding this report, please contact Jennifer Hobbs at (916) 414-6541.

Sincerely,

Daniel Welsh
Assistant Field Supervisor

Enclosure

cc:
Mike Hendrick, NMFS, Sacramento, California
Brad Johnson, Corps of Engineers, Sacramento, California
Jeff Koschak, Corps of Engineers, Sacramento, California
Kursten Sheridan, CDFW, Region 2, Rancho Cordova, California
Jenny Marr, CDFW Region 2, Chico, California

FISH AND WILDLIFE COORDINATION ACT REPORT
SUTTER BASIN FEASIBILITY STUDY/ FEATHER RIVER WEST LEVEE PROJECT

This is the U.S. Fish and Wildlife Service's (Service) Fish and Wildlife Coordination Act report on the effects of the proposed Sutter Basin Feasibility Study/Feather River West Levee Project, Sutter and Butte Counties, California. This report has been prepared under the authority of, and in accordance with, the provisions of the Fish and Wildlife Coordination Act (48 stat. 401, as amended: 16 U.S.C. 661 et seq.).

INTRODUCTION

The information presented in this report is based primarily upon project planning information made available by the Sutter Butte Flood Control Agency (SBFCA) and the U.S. Army Corps of Engineers (Corps). The Corps, Central Valley Flood Protection Board, and SBFCA are coordinating on the feasibility study to reduce flood risk within the study area. In a parallel but separate action, SBFCA is planning the Feather River West Levee Project (FRWLP) which would construct improvements along the Feather River from Thermalito Afterbay downstream to Laurel Avenue. The FRWLP is scheduled to begin construction in 2013, prior to the Sutter Basin Feasibility Study being authorized. In order to implement the FRWLP, SBFCA must obtain permission from the Corps to alter the Federal project under Section 14 of the Rivers and Harbors Act of 1899 (as amended) (33 USC §408 or Section 408). Consequently, two environmental impact statement/environmental impact reports (EIS/EIR) are being prepared, one for the feasibility study and one for the FRWLP. Both projects are being closely coordinated as they involve similar actions and the same participants. This FWCA report analyzes the effects to fish and wildlife and their habitats due to each of the projects, recognizing that only one of the alternatives discussed would be constructed and that this report will be used for both the Sutter Basin Feasibility EIS/EIR and the FRWLP EIS/EIR.

Major flood events have occurred along the Feather River, with the more significant events that caused levee failures and flooding occurring in 1955, 1986, and 1997. In December of 1955, the most significant flood event along the Feather River is reported to have occurred. Several levee embankment failures caused major flooding of nearly all of Yuba City, as well as flooding in Nicolaus. About 156 square miles were flooded during this event. In February of 1986, heavy snow pack and warm rains elevated water levels and caused a levee embankment failure on the adjacent segment of the Yuba River near Linda, flooding nearly 30 square miles including Linda and Olivehurst. The winter of 1996/1997, heavy snow pack and warm rains again elevated water levels. All citizens in Yuba City, Marysville, Linda, and Olivehurst were ordered to evacuate. Ultimately, in January of 1997, a levee embankment failure occurred south of Olivehurst flooding nearly 50 square miles including Olivehurst and Arboga.

Over the past two decades, several studies have been conducted by the Department of Water Resources (DWR), the Corps, and more recently SBFCA to evaluate the condition of the levees protecting the planning area relative to criteria for stability, seepage, erosion, geometry, and levee height. These studies have indicated that the levee system deficiencies include seepage,

slope instability, erosion, and encroachment, and that the consequences of levee failure from a major flood event would be significant. An emergency preparedness mapping study analyzed hypothetical levee failures and determined the rate and depth at which water would flood SBFCA's planning area if a levee failure occurred in the studied reaches. This study predicted flooding depths that could range from about 1-foot to more than 20 feet in some areas.

Further evaluation has demonstrated that much of the existing system does not provide protection from the 100-year flood event, the commonly accepted minimum level of flood protection per the Federal Emergency Management Agency's (FEMA's) National Flood Insurance Program as well as being less than the 200-year level targeted by the State of California for urban areas. The Corps' and SBFCA's goal is to reduce the risk of flooding on the population, property, and critical infrastructure. SBFCA's goal is to achieve a minimum of 200-year flood protection for the more urbanized areas and 100-year for the remaining rural agricultural parts of the planning area.

AREA DESCRIPTION

The Sutter Basin is part of the Sacramento River Flood Control Project, located in north-central California in Sutter and Butte Counties. The elongated, irregularly shaped basin covers about 300 square miles and is about 43 miles long north to south, and up to 14 miles wide east to west. The Sutter Basin is roughly bounded by the Feather River, Cherokee Canal, the Sutter Buttes, and Sutter Bypass. Floodwaters potentially threatening the basin originate from the Feather River watershed or the upper Sacramento River watershed, upstream of the Colusa Weir. These waterways have drainage areas of 5,921 and 12,090 square miles, respectively. In addition to Yuba City, communities in the basin include Biggs, Gridley, Live Oak, and Sutter.

The Corps and SBFCA have determined that flood risk can be reduced by focusing on the Feather River west levee. Consequently, all of the alternatives that they are pursuing deal with remediation of that levee. This portion of the west Feather River Levee extends from Thermalito Afterbay on the north to where the Feather River enters the Sutter Bypass on the south. This corridor is roughly 500 feet from the land side of the existing levees and 100 feet from the water side. The corridor is about 41 miles long.

PROJECT DESCRIPTION

The Sutter Basin Feasibility Study (SBFS) is evaluating two flood-risk reduction alternatives, while the FRWLP is evaluating three flood-risk reduction alternatives. The no-action alternative describes the project without flood-risk reduction measures. All of the alternatives for the SBFS and FRWLP use very similar flood risk-reduction measures. Rather than restate the entire alternatives for SB-7 and SB-8, the FRWLP alternatives will be discussed first and then the SBFS alternative will follow with the differences between these alternatives defined rather than restating the entire alternative.

No Action Alternative

Under the No Action Alternative, the Corps and SBFCA would not implement flood risk-reduction measures. The levees protecting the Sutter Basin would continue to require risk-reduction measures to meet current levee standards, FEMA's minimum acceptable level of flood protection, and State requirements for 200-year for urbanized areas. In addition, the associated risk to human health and safety, property, and the adverse economic impact that serious flooding could cause would continue, and the risk of a catastrophic flood would remain high.

Because of uncertainties in local, State, and federal funding; future state and federal authorization; and other approvals, it is not reasonable to predict construction of levee improvements in the foreseeable future would be completed in a reasonable timeframe. Therefore, for the purpose of evaluating effects under the No Action Alternative, it is assumed that no levee repair or strengthening would be implemented, the purpose and objectives would not be met, and the current level of flood risk would continue.

Alternative 1 (FRWLP)

This alternative would construct a cutoff wall along the centerline of the existing levee to varying depths and a seepage berm along a portion of the landside levee toe. This alternative would predominately keep within the existing footprint of the levee.

For Reaches 2 through 5, Alternative 1 would construct a cutoff wall ranging between 30 feet and 127 feet deep along the centerline of the levee. The levee would be degraded about 50% of its overall height with 2,900 feet of the levee being fully degraded. In addition to the cutoff wall, Alternative 1 would construct a 200-foot-wide seepage berm for 2,268 feet.

For Reaches 7 through 11, Alternative 1 would construct a cutoff wall ranging between 39 feet and 124 feet deep along the centerline of the levee. The levee would be degraded about 50% of its overall height with 1,900 feet of the levee being fully degraded.

SBFCA would acquire a temporary construction easement equal to 50 feet from the existing levee toe or toe of the proposed seepage berm for construction of the levee improvements. An additional 20-foot easement would be obtained where required for the relocation of existing utilities.

For Reaches 13 through 24, Alternative 1 would construct a cutoff wall ranging between 21 and 105 feet deep along the centerline of the levee. The levee would be degraded about 50% of its overall height with about 2,600 feet of the levee being fully degraded. In addition to the cutoff wall, Alternative 1 would include about 11,150 feet of waterside slope flattening, about 5,100 feet of depression infill, and about 1,500 feet of ditch lining.

For Reaches 26 through 41, a cutoff wall ranging between 18 feet and 97 feet deep along the centerline of the levee would be constructed. The levee would be degraded by about 50% of its overall height.

Materials imported to the project site would include water, bentonite, cement, incidental construction support materials, aggregate base rock, hydroseed, and up to 4,343,800 cubic yards of embankment fill material for the new levee surfaces from off-site commercial borrow sites. For backfill of new pipelines crossing the levee, Controlled Low Strength Material (CLSM) (otherwise known as light-weight concrete) is required to be placed to the pipeline's spring line.

Levee improvements are not required for Reaches 6, 14, 15, 29, and 39.

Alternative 2 (FRWLP)

Alternative 2 would construct seepage and stability berms along the landside toe of the levee and a shallow cutoff wall along a portion of the centerline of the levee. The seepage and stability berms would substantially extend beyond the footprint of the current levee, requiring real estate acquisition. In addition, Alternative 2 would include the filling of the existing canal adjacent to the levee in Reaches 26, 27, and 28 with water during periods of high water surface elevation in the river. This would require the construction of regulating structures within the canal to maintain the water level within the canal and create a resistive force against any under-seepage flows.

For Reaches 2 through 5, Alternative 2 would construct an undrained seepage berm ranging between 100 feet and 300 feet wide along the landside toe of the levee. Additionally, an 8-foot high stability berm would be constructed along 20,817 feet of the project. Also, a shallow cutoff wall 20 feet deep would be constructed along the levee centerline for 1,616 feet of the project. The levee would be degraded about 50% of its overall height.

For Reaches 7 through 11, Alternative 2 would construct an undrained seepage berm ranging between 110 feet and 300 feet wide along the landside toe of the levee. A stability berm about 9.5 feet tall would be constructed along 14,163 feet of the project. Also, a shallow cutoff wall ranging between 23 feet and 35 feet deep would be constructed along the levee centerline for 17,800 feet of the project. A portion of the existing Garden Highway would need to be removed and reconstructed to allow construction of the seepage berm.

For Reaches 13 through 24, Alternative 2 would construct an undrained seepage berm ranging between 70 feet and 300 feet wide along the landside toe of the levee. An 8- to 10-foot high stability berm would be constructed along about 24,200 feet of the project. A shallow cutoff wall 20 feet deep would be constructed along the levee centerline for about 14,700 feet of the project. Relief wells would be installed for about 37,400 feet of the project. To facilitate construction of the cutoff wall and to maintain stability of the levee, the levee would be degraded by about 50% of its overall height.

For Reaches 26 through 41, Alternative 2 would construct an undrained seepage berm ranging between 50 feet and 300 feet wide along the landside toe of the levee. A 4- to 10-foot-tall stability berm would be constructed along about 38,600 feet of the project. About 1,300 feet of the existing levee would need to be removed and reconstructed with a zoned filter at the base in combination with a seepage berm. About 15,100 feet of canal would be in-filled.

Materials imported to the project site would include water, bentonite, cement, incidental construction support materials, aggregate base rock, hydroseed, and up to 7,661,100 cubic yards of embankment fill material for the new levee surfaces from off-site commercial borrow sites. For backfill of new pipelines crossing the levee, CLSM is required to be placed to the pipeline's spring line.

Levee improvements are not required for Reaches 6, 14, 15, 29, and 39.

Alternative 3 (FRWLP)

Alternative 3 is the applicant-preferred alternative, combining measures from both Alternative 1 and Alternative 2 to produce the optimized alternative based on screening criteria. This alternative is optimal due to its effectiveness in addressing levee deficiencies, compatibility with land use, minimization of real estate acquisition, avoidance of effects, and cost.

For Reaches 2 through 5, Alternative 3 would construct a cutoff wall ranging between 20 feet and 127 feet deep along the centerline of the levee. The levee would be degraded by about 50% of its overall height. In addition to the cutoff wall, Alternative 3 would construct a 100-foot wide seepage berm for 1,616 feet and a 200-foot wide seepage berm for 2,268 feet.

For Reaches 7 through 11, Alternative 3 would construct a cutoff wall ranging between 39 feet and 124 feet deep along the centerline of the levee. Relief wells with 60 feet spacing and 50 feet deep would be distributed at various locations in Reach 7.

For Reaches 12 through 24, Alternative 3 would construct a cutoff wall ranging between 21 and 105 feet deep along the centerline of the levee. The levee would be degraded by about 50% of its overall height with about 2,600 feet of the levee being fully degraded. In addition to the cutoff wall, Alternative 3 would include relief wells for about 8,200 feet, about 11,150 feet of waterside slope flattening, about 5,100 feet of depression infill and about 1,500 feet of ditch lining. Reach 16 includes waterside slope flattening or other remedial measures.

At Reach 17, a seepage berm 7 feet tall and about 50 feet wide would be constructed beneath the Highway 20 crossing. It extends through the existing abandoned railroad tunnel at the levee landside toe. Pedestrian access through the tunnel will remain after the berms construction.

For Reaches 26 through 41, Alternative 3 would construct a cutoff wall ranging between 18 feet and 97 feet deep along the centerline of the levee. The levee would be degraded by about 50% of its overall height. About 1,300 feet of levee would be degraded and reconstructed with a 5 to 1 slope (horizontal to vertical). Reach 31 includes cutoff walls in addition to waterside slope flattening or other remedial measures. In Reach 38 an adjacent levee with a 20-ft wide crown will be constructed using the tailings materials located along the landside of the existing levee. In Reach 41, a 150-feet wide drained seepage berm will be constructed with a 1-ft thick filter drain along the bottom. The filter drain would provide drainage for seepage through the levee. The existing concrete outfall structure located at the south end of this reach would remain in place and would be backfilled with earth materials. This alternative would also include filling of the waterside pit located at the south end of this reach. A 30-foot wide construction access area

would be provided at the toe of the seepage berm. About 9,500 feet of canal would be monitored with a Flood Safety Plan.

Materials imported to the project site would include water, bentonite, cement, incidental construction support materials, aggregate base rock, hydroseed, and up to 1,150,000 cubic yards of embankment fill material for the new levee surfaces from off-site commercial borrow sites. For backfill of new pipelines crossing the levee, CLSM is required to be placed to the pipeline's spring line.

Levee improvements are not required for Reaches 6, 14, 15, 29, and 39.

SB-7

This alternative for the feasibility study closely aligns with the FRWLP Alternative 3 alternative description except for the easement that would be acquired and the length of levee that would be repaired. The Corps would only acquire a 20-foot easement on the landside of the levee and a 15-foot easement on the waterside. The Corps would require full compliance with the Corps policy regarding woody vegetation on levees (Engineering Technical Letter 1110-2-571 "Guidelines for Landscape Planting and Vegetation Management on Levees, Floodwalls, Embankment Dams, and Appurtenant Structures") which would result in more vegetation removal with this alternative than with Alternative 3.

SB-7 would only extend through reach 21 of the project area, resulting in a proposed repair length of about 24 miles long. Of this length, 2,250 feet of levee improvement would be made downstream of Laurel Avenue and consist of a 100-foot-wide undrained seepage berm (5-foot thick at berm toe) in combination with a cutoff wall extending to an elevation of 25 feet deep. The additional work is proposed because this area is located in an area that is highly conducive to seepage distress.

SB-8

This alternative for the feasibility study closely aligns with the FRWLP Alternative 3 alternative description. Differences include the reduced easement compared to the FRWLP, as described in SB-7 and the full compliance with Corps' vegetation management standards. Relocation of either the levee or the Sutter-Butte Irrigation Canal (SBIC) would occur where the SBIC is adjacent to the levee. This would provide space for an operations and maintenance road between the canal and levee. The relocation of either the SBIC or levee is described below:

a. Area 1a (Reach 21) would involve 483 linear feet of canal relocation landward into adjacent agricultural land to provide space between the canal and the levee for a landside operations and maintenance road.
b. Area 1b (Reach 22) would move 1,900 linear feet of levee waterward into the floodplain to provide sufficient space for the landside operations and maintenance road.
c. Area 2 (Reach 24) would move 1,200 linear feet of levee waterward into the floodplain to provide sufficient space for the landside operations and maintenance road.
d. Area 3a (Reach 28) would move 7,900 linear feet of levee waterward into the floodplain to provide sufficient space for the landside operations and maintenance road.

e. Area 3b (Reach 28) would move 1,200 linear feet of canal landward into adjacent agricultural area to provide space for the operations and maintenance road.

Canal relocation would occur during the regular construction season. The new canal is offset from the old canal and a berm would separate the two. The greatest distance between the old and new canal would be 81 feet. Plugs would remain at each end of the canal where it ties into the existing canal. In the winter following construction, when the irrigators no longer send water through the canal and it is dry for 2 months, the plugs would be removed and the abandoned canal section would be filled. The small relocation of the canal at the sunset pump station can be accomplished by simply excavating the opposite side of the canal (widening the canal) when the canal is dry and filling the opposite side of the canal.

An additional 2,250 feet of levee improvement would be made downstream of Laurel Avenue and consist of a 100-foot wide undrained seepage berm (5-foot thick at berm toe) in combination with a cutoff wall extending to an elevation of 25 feet deep. The additional work is proposed because this area is located in an area that is highly conducive to seepage distress.

To provide protection in the event of water overtopping the levee the Corps is proposing to use Anchored High Performance Turf Reinforced Mat along two levee sections. This would occur for 5,760 linear feet in Reaches 7 and 8 and 1,900 linear feet in Reach 23.

EXISTING BIOLOGICAL RESOURCES

Vegetation

Seven land cover category types can currently be found in the project area: riparian forest, riparian scrub-shrub, oak woodland, wetland, agricultural lands, ruderal, and developed/disturbed areas.

Riparian Forest habitat occurs along the Feather River and its tributaries, and supports an overstory dominated by mature native and nonnative trees. The dominant overstory species are valley oak, Fremont cottonwood, and Gooding's black willow. Other trees commonly observed within the riparian habitat were box elder, arroyo willow, Oregon ash and western sycamore. Understory species include horsetails, mugwort and curly dock.

California grape covers many of the trees and shrubs in the riparian forest and several patches of the invasive giant reed were found to occur along the edges of the riparian areas.

Riparian Scrub-Shrub habitat within the biological study area consists of shrubs such as willows, blue elderberry, coyote brush, Himalayan blackberry, and button bush.

Oak Woodland habitat is found in two small patches just south of Almond and Laurel Avenues in the study area. The oak woodland are dominated by valley oak and have an understory that includes wild oat, soft chess, ripgut brome, field hedge parsley and invasive yellow starthistle.

Wetland habitat in the study area consists of natural and agricultural waterbodies: irrigation ditches, open water, seasonal wetlands, streams, and tailing wetlands. Irrigation and drainage

canals typically occur along the landside of the levee and service the agricultural fields. There tends to be sparse vegetation growing along the edge of the canals. Seasonal wetlands and tailing wetlands typically have aquatic and/or emergent vegetation such as common duckweed, primrose, or narrowleaf cattail. The tailing wetlands are typically bounded by trees and shrubs. Open water areas consist of standing water with little vegetation. These occur at the northern and southern portions of the project area.

Agricultural lands are a predominant habitat in the project area and are made up largely of orchards and field and row crops. Orchards are the dominant land cover-type and occur throughout the study area. The majority of the orchards consist of walnut, plum and peach trees that are actively maintained. Herbaceous ground cover under the tree rows is highly variable and depends on the type and frequency of maintenance. When present, the herbaceous vegetation is mostly nonnative weedy species. Field and row crops can largely be found in the southern portion of the study area. Both active and fallow fields that showed indicators of tillage were included in this habitat type. Common field and row crops in the area include sweet corn, alfalfa, wheat, and tomatoes.

Developed areas within the study area consist of urban (residential and commercial) centers, ranchettes, rural neighborhoods, agricultural outbuildings, farm equipment storage areas, pumping stations, and a plant nursery.

Ruderal areas within the study area occur as swaths on both sides of the centerline of the levee where the native soil has been substantially altered. The largest ruderal areas are located between Vance Avenue and the northern terminus of the study area. These areas represent past and ongoing disturbance associated with agriculture, levee construction and maintenance, and excavation.

Trees found in ruderal areas include valley oak, Fremont cottonwood, and black willow. Common shrubs found consist of coyote bush, tree tobacco, Himalayan blackberry, and blue elderberry. Herbaceous vegetation is dominated by annual grasses such as wild oat, soft chess, ripgut brome, and foxtail barley. Non-native forbs such as yellow star-thistle, prickly lettuce, field hedge parsley, mustard, and rose clover occur in the study site as well as native forbs, Spanish lotus, California poppy, fireweed, and western verbena.

Wildlife

Riparian habitat communities provide wildlife with dispersal and migration corridors, foraging areas, cover, and breeding habitat. Riparian trees provide nesting habitat for a variety of raptors, egrets, herons, songbirds, and bats. Riparian forest also provides foraging habitat for numerous species of migratory and wintering birds. Typical mammal species that can be found in riparian areas include deer, raccoons, beavers, coyotes, and skunks. Reptiles and amphibians are also associated with a riparian habitat. Species of reptiles and amphibians include the giant garter snake, western fence lizard, western pond turtle, Pacific tree frog, western toad, and bullfrog.

Oak Woodland provides nesting habitat for a variety of raptors and other tree nesting migratory birds. Additionally, great-horned owl, barn owl, and yellow-billed magpie are known to utilize

this habitat as well. Reptiles and mammals that occur in the riparian habitat may also utilize oak woodlands for foraging and cover habitat.

Wetland habitats in the affected area include riverine areas, ponds, canals, and small ditches. In addition to providing habitat for fish, open water habitat provides foraging, cover and reproductive sites for a variety of wildlife species. Open water areas provide foraging habitat for raptors, herons, egrets, waterfowl, water birds, and land birds. Many of the reptiles and amphibians that use riparian habitat use open water habitat for breeding, foraging, and cover.

Canals and ditches that contain water through mid-fall, have suitable prey, and adequate cover have the potential to support giant garter snake. Mammals that use the open water habitats include different species of bats that forage for insects over open water. Terrestrial mammals such as deer, raccoon, skunk, and opossum, use open water habitat for water sources. Semi-aquatic and aquatic mammals that are found within open water habitat include beaver, river otter, mink, and muskrat.

Orchards have limited value for wildlife, although certain birds, such as the red-shouldered hawk, American crow, yellow-billed magpie, mourning dove, European starling, and rock pigeon may nest or forage in these areas.

Row and field crops provide foraging opportunities for a variety of raptors and other migratory and resident birds such as sandhill crane, blackbirds, western meadowlark, and rock pigeon. Similar species are known to use irrigated fields for foraging, and birds such as burrowing owl, northern harrier, and western meadowlark are known to nest in these areas.

Developed lands provide limited habitat for wildlife but are known to support common "urban-dwelling species" such as northern mockingbird, rock pigeon, mourning dove, house sparrow, house finch, western scrub jay, Botta's pocket gopher, California ground squirrel, house mouse, black rat, and coyote. Semi-developed areas with grass, trees, and a water source can provide habitat for additional wildlife species.

Ruderal areas in the project site have a variety of native and non-native trees, shrubs, grasses, and forbs like described in the vegetation section. Similar to developed lands, these areas support mostly common wildlife species, although some elderberry bushes, which support valley elderberry longhorn beetle, were found scattered in the area.

Fisheries

The study area includes over 40 miles of the Feather River's western bank, and the various water bodies in the study area provide spawning, rearing, and migratory habitat for a diverse assemblage of native and non-native fish species. Native species present in these streams can be separated into anadromous and resident species. Native anadromous species include two runs of Chinook salmon, steelhead, green and white sturgeon, Pacific and river lamprey. Native resident species include Sacramento pikeminnow, Sacramento splittail, Sacramento sucker, hardhead, California roach, and rainbow trout. Non-native anadromous species include striped bass and American shad. There are numerous non-native resident species such as catfish, black bass, crappie, sunfish and minnows.

There are many factors affecting the abundance of fish species on the Feather River and its tributaries. Riparian and shaded riverine aquatic habitat has decreased significantly with the building of dams, levees, and water diversions, and floodplain access for spawning and rearing has been diminished from what it once was. In addition to habitat alterations, other factors that limit fish species abundance include non-native fish introductions, food availability, entrainment due to water diversions, and water temperature.

Endangered Species

Appendix A provides the Service's biological opinion for the FRWLP, dated May 2, 2013, pursuant to section 7(a) and (c) of the Endangered Species Act (Act) of 1973, as amended.

In addition, the western yellow-billed cuckoo, a candidate species, may occur in the project area. Although candidate species are not protected under the Act, the 1988 amendments require the Service or NOAA Fisheries to monitor their status. If this species declines precipitously during the planning of this project, it could be listed on an emergency basis.

NOAA Fisheries has responsibility for most marine fish and wildlife, including anadromous salmonids, and should be consulted on activities which may affect any such listed or proposed species in the project area. The Service has consultation responsibility for the remaining species.

The California Department of Fish and Wildlife (CDFW) has responsibility for State listed species and species of concern. The CDFW should be contacted regarding any State listed species or species of concern that may be impacted by project activities.

FUTURE CONDITIONS WITH THE NO ACTION ALTERNATIVE

Vegetation

The No Action Alternative represents the continuation of the existing deficiencies in the levee along the west bank of the Feather River between the Sutter Bypass and Thermalito Afterbay. No levee improvements would be made and no construction related effects on vegetation or wetland would occur. Compliance with the Corps levee vegetation policy could lead to permanent loss of woody vegetation which would result in a significant effect on riparian habitat.

Wildlife

Under the No Action Alternative, the aquatic resources of the project area are not expected to change significantly from existing conditions. Since current levee operations and maintenance activities would continue as is, and there would be no change in the geomorphic or flood control regimes, resident and migratory wildlife would continue to use the area as they do today.

Because no levee improvements would be made under the No Action Alternative, the risk that the levees along the west bank of the Feather River could fail due to seepage or slope stability/geometry issues would continue. A catastrophic levee failure would result in flooding and inundation that could significantly affect wildlife and their upland or wetland habitats. A

major flood event could result in damage to the riparian forest, and given the importance of the riparian corridor to numerous special-status species, loss or fragmentation of this habitat would be a significant effect. Given the uncertainty of the occurrence or magnitude of such an event, potential effects on wildlife and their habitats cannot be quantified based on the available information.

Fisheries

Under the No Action Alternative, the aquatic resources of the project area are not expected to change significantly from existing conditions. Since current levee operations and maintenance activities would continue as is, and there would be no change in the geomorphic or flood control regimes, resident and migratory fishes would continue to use the area as they do today. Compliance with the Corps levee vegetation policy could lead to permanent loss of woody vegetation which would result in a significant effect on riparian habitat.

Because no levee improvements would be made under the No Action Alternative, the risk that the Feather River levee could fail and cause major damage would be greater. If the levees were to fail, it could result in the displacement of fish into flooded areas where the potential for stranding and mortality is high. In addition, flooding could cause adverse water conditions due to hazardous materials being released, which could adversely affect fish populations.

FUTURE CONDITIONS WITH THE PROJECT

Vegetation and Wildlife

Given the similarities in all the alternatives the following discussion on vegetation and wildlife applies to all the alternatives. Where there are substantial differences in the alternatives they are discussed below.

Habitat losses would occur linearly along the 41 miles of levee. Currently the position of the levee varies in distance from the river, with a minimum of the levee and bank of the river being the same to a maximum of about 5,000 feet. Using a GIS layer of the footprint of the various alternatives and measuring the lengths of the levee, the Service calculated that about 11 discontinuous miles of levee would be constructed within 300 feet of the Feather River's edge. Because Alternatives 1, 2, and 3 footprints are almost exactly the same on the waterside of the levee the above number applies to all of these alternatives. The SB-8 alternative is longer by 2,250 linear feet; however, the above number would also apply to this alternative because the additional length of levee is more than 300 feet from the edge of the river. The SB-7 alternative is the shortest of all the alternatives with the total length of levee being about 23 miles. Of this about 7 discontinuous miles of riparian habitat would be removed within 300 feet of the edge of the Feather River. The majority of the riparian forest and riparian scrub shrub that would be removed due to any of the alternatives occurs on the waterside. Removing trees and shrubs along these discontinuous segments of riparian habitat where the stand widths are already narrow is a greater loss of the habitat and therefore a larger effect on the wildlife species that would be using this habitat. Narrowing of riparian corridors decreases the diversity of species and vegetative layers that wildlife species can use. Narrowing of riparian habitat could isolate some species that may require contiguous vegetated areas to move up and down the river course.

All of the alternatives address deficiencies in the levees primarily using cutoff walls and seepage berms which result in potential adverse effects on wildlife resources. Effects of construction on wildlife in the area include disturbance from construction activity and noise. Amphibian and reptile species typically are not as mobile as other types of wildlife. Consequently they have a greater chance of being killed during construction activities. Wildlife such as birds and mammals, typically respond to this type of activity by leaving the construction area. It is likely they would move into adjacent habitat outside of the zone of construction noise and disturbance. However they may be forced to move to less than optimal habitat conditions as other animals may have established territories in the surrounding habitat. Pre-construction nesting bird surveys would avoid disturbing or destroying any nests within the vegetation removal area and comply with the Migratory Bird Treaty Act.

Oak woodland would be minimally affected with SB-8 affecting, at most, 1.3 acres. Effects to species from the loss of this habitat would be similar to what is described above during construction. The loss of wetland types varies with alternative. Small farm canals would be filled for all alternatives due to the construction of the seepage berm adjacent to agricultural lands. The majority of these are small (about 3 feet wide) and only have water in them when the farmers irrigate their fields. While some bird species such as herons and egrets can use this habitat for foraging, the inconsistent water regime and yearly disturbance by the farmers keeps most vegetation out of the canals, thus they tend to not provide much habitat value for wildlife species. Alternative 2 is the only alternative affecting pond habitat. There is a privately owned pond at the lower end of the project area which would be filled due to construction of a seepage berm. The loss of this habitat would likely affect bird species such as herons, egrets, and waterfowl, and amphibian species such as toads and frogs. Given the location is on the landside of the levee and the surrounding landuse is predominately agricultural, this habitat type is not common in the area and would adversely affect native wildlife species.

Seasonal wetlands, open water, and tailing wetlands are affected in almost every alternative. This habitat is scattered along the project area, though the tailing wetlands are at the upper end of the project area near Thermalito Afterbay. These areas typically have frequent bird use as well as serve as habitat for native amphibians such as chorus frogs and spadefoot toad. Construction within and around these areas would adversely affect these wildlife species through the direct loss of habitat as well as effects to species using surrounding areas due to noise and construction activity.

Because the construction would be accomplished over a 4-year period and along a long linear footprint and adjacent habitat in the form of riparian forest and scrub shrub would remain unaffected due to the project, it is likely the birds and mammals not dependent on woody vegetation would move back into the area once construction is completed. Species which rely on riparian vegetation would experience a loss of habitat within the corridor. The Corps and SBFCA would mitigate for the loss of riparian habitat by creating the Star Bend Conservation Area. However, there would be a temporal loss of habitat for all of the alternatives until the habitat grows mature enough to be habitat for certain species. For example raptors require large trees to build nests in; the trees at the Conservation Area may not reach a suitable size until 20 or more years post-planting. Species such as woodpeckers which require snags would not have that habitat available to them for a longer period of time. Once established and maturing, new

riparian habitat at Star Bend Conservation Area would connect existing riparian habitat within the corridor providing better connectivity and dispersal corridors than what currently exist.

Effects to ruderal habitat would be primarily temporary, with the habitat disturbed and replaced within a year. However; with SB-7 and SB-8, the Corps is proposing to place 5,760 linear feet and 7,660 linear feet respectively of erosion protection on the landside of the levee face. This would prevent erosion in the event of a levee overtopping. Placement of this material would prevent this area from being used by ground burrowing animals such as ground squirrels. While much of the surrounding area would still be available for these animals, the animals that depend on these burrows may find this loss detrimental since species such as giant garter snakes and burrowing owls do not create burrows themselves, but rely on other species to create them.

Table 1 summarizes the affected habitat types by Alternative.

Table 1. Acreages of Habitat Types Affected by Alternative

Habitat Type	Alternative 1	Alternative 2	Alternative 3	SB-7	SB-8
Riparian Forest	17.83	26.67	22.19	24.40	42.00
Riparian Scrub Shrub	0.39	3.09	1.29	0.02	0.50
Oak Woodland	0.22	0.24	0.22	1.00	1.30
Canal/Ditch	24.96	27.54	.21	1.4	7.1
Pond/Basin	0.00	1.91	0.00	0.00	0.00
Stream/River	0.00	0.00	0.00	0.02	1.9
Tailing Wetlands	0.14	0.58	0.13	0.00	0.13
Seasonal Wetlands	0.18	0.19	0.03	0.18	0.18
Open Water	0.17	0.62	0.04	0.19	0.19
Orchards	223.38	666.70	101.71	37.80	85.80
Field and Row Crops	17.42	92.03	4.76	0.70	3.80
Ruderal	522.01	559.87	550.80	395.50	552.00
Developed	222.40	259.56	196.00	125.00	199.00

Fisheries

Riparian habitat provides nutrients to the water which supports the feeding of many fish species. When immediately adjacent to the water, riparian habitat can provide shade and structure for fish to use for escaping higher velocity flows and predators. The loss of this type of habitat would adversely affect fish species. Other effects include increases in turbidity and suspended sediment due to construction activities, possible contaminant discharge from the construction equipment, and adverse effects caused by construction noise and vibration. Only certain reaches of the project are immediately adjacent to the river. Over the course of the 41 miles, about 11 miles of levee come within 300 feet of the Feather River. It is at these locations where vegetation loss

and its effects to fishes are most critical. In the other locations the remaining riparian vegetation can serve as a buffer and minimize effects to sediment making its way into the river. Where the buffer is lacking, the loss of vegetation would affect the addition of nutrients through leaf drop to the water. In these locations the vegetation loss would not be replaced by creating habitat at Star Bend Conservation Area. However, Star Bend Conservation area is adjacent to the river and a wider band of riparian habitat would be planted along the 1,250 linear feet which borders the Feather River. Ultimately, at the widest point, a 1,250 wide band of riparian habitat would be created at the Star Bend Conservation Area.

Endangered Species

The Corps and SBFCA have completed section 7 consultation with the Service on Alternative 3 of the FRWLP (Appendix A). Consultation with CDFW under California Endangered Species Act (CESA) needs to be completed to determine the effects of this project on State listed species.

DISCUSSION

The Service would like to comment on the lack of incorporating a setback levee into any of the alternatives. All of the current alternatives consist of fixing the existing levee in place. Setting the levee back in strategic locations would benefit both fish and wildlife species, by creating more floodplain habitat, as well as the flood system by increasing channel capacity and decreasing maintenance by lessening levee erosion. While the Service appreciates the attempts to minimize effects to existing habitat, we would like to see active movement toward creating a sustainable, reliable, and resilient flood and riparian system. Would the current levee alignment that is being improved in place be able to withstand changing future conditions such as climate change? While the EIS/EIR addresses climate change it does not address the ability of the flood control system to adapt to climate change and potentially the different precipitation patterns which may occur. DWR's Central Valley Flood Protection Plan also outlines the goals for flood control projects that DWR participates in. One of the secondary goals is promoting ecosystem restoration. Inclusion of setback levees into this project would help DWR progress on that goal as well as meet DWR's Environmental Stewardship Policy. Both SBFCA and the Corps should consider looking at opportunities to expand the floodway and include these within the selected alternative.

The Service's primary concern with the effects to fish and wildlife is the loss of riparian and wetland habitats. These habitat types would have the largest native habitat loss in each alternative. SBFCA completed section 7 consultation on Alternative 3 for species listed under the Service's jurisdiction. This Alternative avoids as much vegetation removal as possible by working around vegetation when possible. Additionally, it minimizes temporary effects to habitats such as canals/ditches and various waters by limiting the amount of time they are disturbed and restoring them once the construction in the area is completed. Any permanent effects to native habitats, riparian, oak woodland, and seasonal wetlands should be mitigated. To mitigate effects to wetlands SBFCA has proposed to buy credits at a wetland mitigation bank at a ratio of 2:1. The Service concurs this would mitigate the effects to wildlife species due to the loss of wetland habitat.

To offset the loss of riparian forest, riparian scrub, and oak woodland, SBFCA has calculated the total diameter at breast height (dbh) of all native trees which would be removed due to the project. They have proposed to plant a variety of native seedlings at the Star Bend Conservation Area to create a diverse riparian habitat which would restore 28 acres of ruderal floodplain habitat to riparian habitat. Restoration of this area would expand riparian habitat within the area because it is immediately upstream of the O'Connor Lakes Unit of the Feather River Wildlife Area which has had riparian habitat planted within the last 10 years. The Service believes the restoration of this area would mitigate for some of the effects to the loss of riparian and oak woodlands; however, the Service does not agree that the 28 acres adequately mitigates for the entire loss. Many large trees would be removed as a result of the project. The trees planted to mitigate this impact would not reach the size of the some of the affected oak, cottonwood, and sycamore trees for 50 years. To mitigate the loss of this habitat for wildlife species the Service believes that a ratio of at least 2:1 should be used to mitigate the loss of riparian forest, riparian scrub shrub, and oak woodland. Even with the increase in riparian habitat within the Feather River Corridor with the Starbend Conservation Area there will still be a temporal loss to species that use large trees for nesting, foraging, or sheltering. The additional acreages should be found within the 41 mile proposed project area in order to maintain or benefit connectivity of the riparian corridor along the Feather River.

The Service also has concerns about effects to wildlife and fish due to ongoing operation and maintenance (O&M) of the flood control facility. Under the SBFS, the Corps has included O&M as part of the project description. The FRWLP is not proposing to change existing O&M activities and therefore they have not covered these activities in their project description. Currently, effects to federally threatened and endangered species due to O&M activities have not been analyzed. As the Corps is a federal agency that requires DWR and the local maintaining agencies to operate and maintain the flood control structures according to the federal guidelines, the Corps should initiate section 7 on these activities if there are effects to listed species. The Service feels that some of the ongoing O&M activities are likely to adversely affect the valley elderberry longhorn beetle and giant garter snake in this area. Should the Corps reinitiate section 7 consultation for the SBFS, they should include O&M activities in the reinitiation. Additionally, the Corps should provide information regarding O&M to the Service so we can update this Fish and Wildlife Coordination Act report and include effects to fish and wildlife due to O&M activities. Should the Corps not reinitiate section 7 consultation under the SBFS they should initiate section 7 consultation with the Service for ongoing O&M activities given their role as a federal agency and their discretion over the O&M manual.

RECOMMENDATIONS

If the project is constructed, the Service recommends that the Corps implement the following:

1) Mitigate the loss of any natural habitat types (riparian forest, riparian scrub shrub, oak woodland, wetland, pond, canal, stream) at a ratio of at least 2:1.

2) Should the Feasibility Study move forward the Corps should work with DWR and SBFCA to develop a variance to allow vegetation within the Corps' vegetation free zone to remain in place.

3) Work with the Service on the development of the mitigation area.

4) Lands disturbed by construction activities, including the staging areas, should be reseeded with native grasses and forbs. Reseeding should be conducted just prior to the rainy season to enhance germination and plant establishment.

5) Conduct pre-construction surveys for breeding birds including the State listed Swainson's hawk and burrowing owl.

6) Develop and implement a vegetation monitoring program as part of the project. Monitoring the riparian restoration effort should focus on (a) recording tree survival rates, (b) the quantification of improved habitat values for wildlife (primarily bird species) by measuring percent tree and shrub cover, average height of overstory trees, canopy layering, and total woody riparian vegetation, and (c) developing recommendations for alternative methods of riparian restoration should initial efforts fail. A vegetation monitoring report should be submitted annually for the first 5 years after planting activities, and on the 10^{th}, 15^{th}, and 20^{th} year after planting. The monitoring reports should also identify any shortcomings in the restoration effort and include remedial actions on how to improve restoration efforts. All phases of the revegetation, and monitoring programs should be coordinated with, and approved by, the Service, CDFW, and NOAA Fisheries.

7) Comply with the Conservation Measures and Terms and Conditions in the biological opinion (Appendix A).

8) Complete the appropriate consultation with the CDFW regarding impacts to State listed species, and NOAA Fisheries, as required under section 7 of the Endangered Species Act, for potential impacts to anadromous fish under NOAA Fishery's jurisdiction.

9) SB-7 or SB-8 (depending on the alternative selected) should mitigate for the loss of upland habitat lost due to erosion protection. Effects resulting from this action should be discussed both under the FWCA as well as the federal and State endangered species acts.

10) Initiate section 7 consultation with the Service on the effects of O&M activities to federally listed species.

Appendix A

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825-1846

In Reply Refer To:
08ESMF00-2013-F-0342-1

MAY 02 2013

Ms. Alicia Kirchner
Chief, Planning Division
U.S. Army Corps of Engineers, Sacramento District
1325 J Street
Sacramento, California 95814

Subject: Formal Consultation on the Feather River West Levee Project, Sutter County, California

Dear Ms. Kirchner:

This is in response to your March 22, 2013, request for formal consultation with the U.S. Fish and Wildlife Service (Service) on the Feather River West Levee Project (FRWLP) (proposed project) in Sutter County, California. Your request was received on March 28, 2013. You requested our concurrence that the proposed project may affect, and is likely to adversely affect the federally-listed as threatened valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*)(beetle) and the giant garter snake (*Thamnophis gigas*)(snake). The Service concurs with your determination and this biological opinion addresses the effects of the proposed projec: on these two species. Critical habitat has been designated for the beetle; however, the proposed project is not located within any designated or proposed critical habitat. Critical habitat has not been designated for the snake; therefore, none will be affected. This response is in accordance with section 7(a)(2) of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (Act).

This biological opinion is based on information provided in the U.S. Army Corps of Engineers' (Corps) letter requesting consultation and their biological assessment. A complete administrative record is on file at the Sacramento Fish and Wildlife Office.

CONSULTATION HISTORY

July 13, 2012. The Service, ICF International, HDR Inc., consultants to Sutter Butte Flood Control Agency (SBFCA), SBFCA, California Department of Fish and Wildlife (CDFW), California Department of Water Resources, and the Corps participated in a site visit to the proposed project. Potential effects to giant garter snake were discussed on the trip.

September 27, 2012. The Service, Corps, HDR, and ICF met to discuss the biological opinion and the level of detail that will be available in order to initiate consultation. The applicant determined that they will have sufficient information to initiate consultation at the project level.

December 18, 2012. The Service, Corps, SBFCA, ICF, and HDR met to discuss effects to giant garter snake. Permanent and temporary effects were discussed as well as the Service providing suggestions on conservation measures that could be incorporated.

February 12, 2013. The Service, Corps, ICF, CDFW, and HDR met to discuss long-term operations and maintenance (O&M). The outcome of this meeting was that the SBFCA FRWLP will not include operations and maintenance in their project description because their project will not be changing O&M. However, the Corps will be initiating consultation on the Sutter Feasibility Study in the next 6 months and this project description will include O&M activities.

March 22, 2013. The Corps initiated section 7 consultation with the Sacramento Fish and Wildlife Office.

BIOLOGICAL OPINION

DESCRIPTION OF ACTION AREA

North to south, the Action Area consists of the 41-mile corridor along the west levee of the Feather River from the Thermalito Afterbay to a point about 4 miles north of the Sutter Bypass. The Action Area includes the project construction area and a 100-foot buffer around this area which includes staging and spoils areas. The project construction area was defined as the area in which levee improvements—such as seepage berms, stability berms, relief wells, sheet-pile walls, and slurry cutoff walls—are likely to be constructed. All direct and indirect effects will occur within this area and the 100-foot buffer around this area.

The corridor is divided into 41 relatively homogeneous reaches for ease of describing existing conditions, project components, land cover-types, and potential effects (note that this number is coincidental and one reach does not correspond to a length of 1 mile; additionally, Reach 1 is not part of the FRWLP) (Figure 1).

The Action Area also includes six potential borrow sites that could supply the borrow material necessary for levee construction and upgrades, and routes from the project construction area to the borrow sites. It is not anticipated that all six sites will be used over the multi-year phased construction period, but until additional geotechnical and soil samplings are completed, all sites will be available for use and are included in the Action Area.

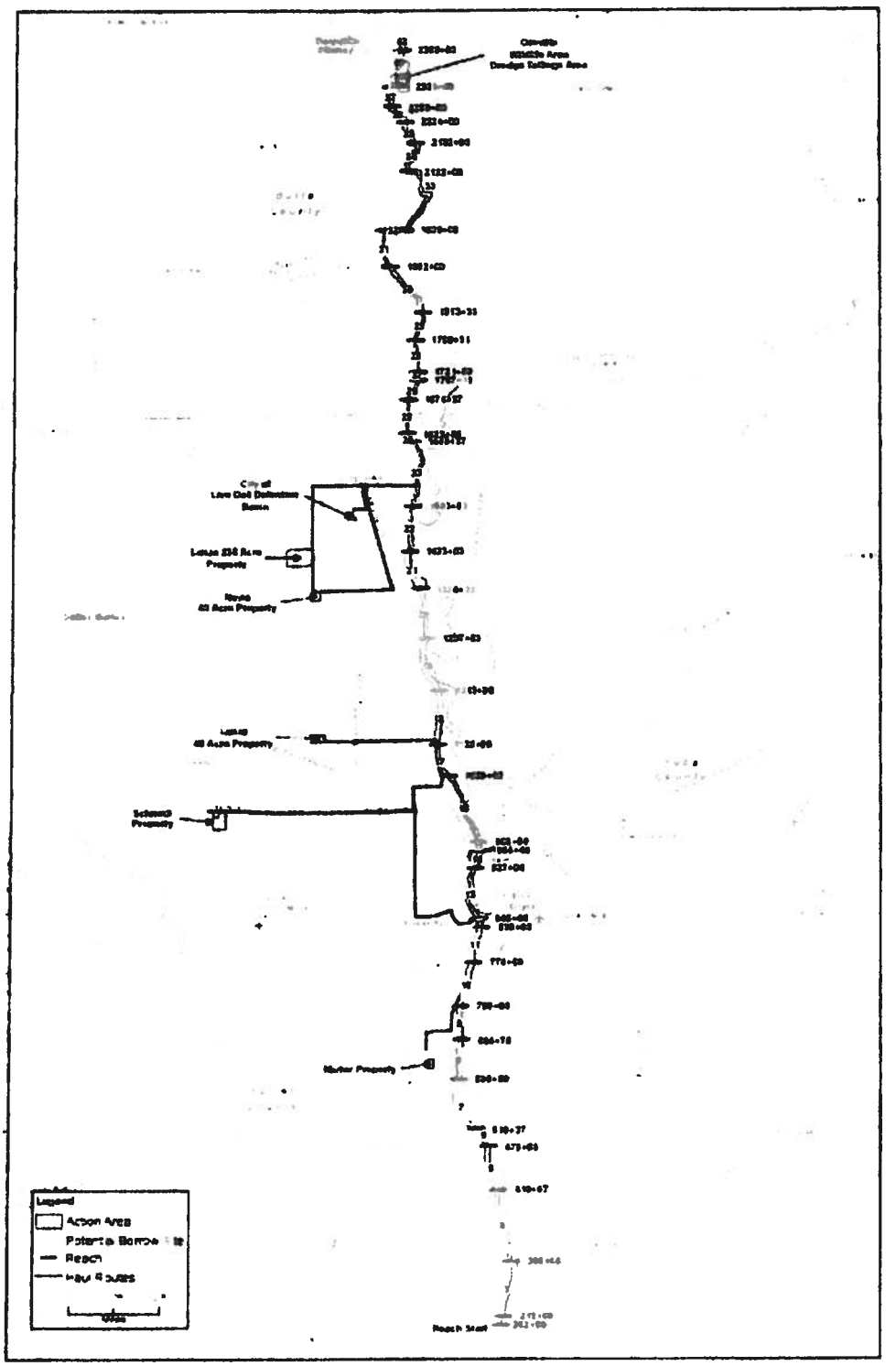

Figure 1. Proposed Project

Finally, the Action Area includes the existing 48.5-acre Star Bend Conservation Area, located on the west levee of the Feather River, about 6 miles south of Yuba City. Compensation for the Proposed Action's effects on the beetle is proposed to occur in a portion of this conservation area, which is discussed below under Conservation Measure 5.

Description of Proposed Action

The primary purpose of the FRWLP is to reduce flood risk in the Sutter Basin by addressing known levee deficiencies along the Feather River West Levee from Thermalito Afterbay downstream to a point about 4 miles upstream of the Feather River's confluence with the Sutter Bypass. While the FRWLP will not by itself reduce all flood risks affecting the Sutter Basin, it will address the most immediate risks based on the following.

- The proximity of the Feather River to population centers and key infrastructure.
- The nature of the Feather River West Levee being the longest and most contiguous portion of the planning area perimeter.
- The location of known levee deficiencies and the clarity and feasibility of available measures to address them.

The construction of the FRWLP will be divided into four separate construction contracts. Contract A begins near the intersection of the Feather River West Levee and Laurel Road. It continues north to the beginning of the improvements constructed as part of the Star Bend Setback Levee Project. The total length of the levee in this portion of the FRWLP is 27,618 linear feet. Contract B begins at the end of the improvements constructed as part of the Star Bend Setback Levee Project, and continues north for 31,963 linear feet. Contract C begins near the north end of the Shanghai Bend Setback Levee, and continues north for a total of 77,886 linear feet. Contract D then begins and continues north for 69,363 linear feet.

For Contract A, a cutoff wall ranging between 10 and 35 feet deep will be constructed along the centerline of the levee for the entire length of levee. The overall height of the levee will be degraded by about 50%. In addition to the cutoff wall, a portion of the levee will have a 9,816-foot-long; 100-foot-wide seepage berm installed.

For Contract B, a cutoff wall ranging between 5 and 25 feet deep will be constructed along the centerline of the levee for 31,600 linear feet. The overall height of the levee will be degraded by about 50%. Relief wells 60 feet apart and 50 feet deep will be installed along a 2,500 linear foot section. Finally, two small sections will involve pipe crossing work.

For Contract C, a cutoff wall ranging between 5 and 65 feet deep will be constructed along the centerline of the levee for 62,117 linear feet. The overall height of the levee will be degraded by about 50%, with about 5,900 linear feet of the levee needing to be fully degraded. A 7-foot tall

and 50-foot-wide seepage berm will be placed near the 10th Street bridge and extend through the existing abandoned railroad tunnel. Finally, there will be a few storm drain pipes replaced within the levee.

For Contract D, a cutoff wall ranging between 10 and 90 feet deep will be constructed along the centerline of the levee for 57,361 linear feet. For all but 317 linear feet of levee, the levee will be degraded by about 50%. The remaining 317 linear feet will have a full levee degrade and reconstruction. A canal runs adjacent to the landside of the levee for 4,723 feet. The landside levee will require reconstruction to the bottom of the canal. Six storm drain and irrigation pipes will need to be replaced along a section of the levee. About 4,800 linear feet of seepage berm will be constructed at the northern end of the proposed project. The berm will very in width between 100 and 170 feet. Additionally, a waterside pit located in this area will be filled.

Materials imported to the construction site will include water, bentonite, cement, incidental construction support materials, aggregate base rock, hydroseed, and up to 1,500,000 cubic yards of embankment fill material for the new levee surfaces from offsite commercial borrow sites or local landowners willing to sell borrow material. For backfill of new pipelines crossing the levee, controlled low strength material (CLSM) (otherwise known as lightweight concrete) will be placed to the pipeline's spring line.

Construction methods for the flood management measures are described in detail below.

Slurry Cutoff Wall

A slurry cutoff wall consists of impermeable material that is placed parallel to the levee, typically through the center of the levee crown. There are three methods for constructing a slurry cutoff wall: (1) conventional slot trench, (2) deep soil mixing (DSM), and (3) jet grouting. The first two are the primary methods for application over longer areas, while jet grouting is a spot application based on limiting conditions. A slurry cutoff wall addresses the deficiency of seepage (through- and under-seepage).

Conventional Slot Trench Method - To begin construction, the construction site and any necessary construction staging or slurry mixing areas are cleared, grubbed, and stripped. In the conventional slot trench method, a trench is excavated at the top center of the levee and into subsurface materials. The size of the trench is based on the severity of the seepage but can be typically 3 feet wide and up to 80–90 feet deep. As the trench is excavated, it is filled temporarily with bentonite water slurry to prevent cave-in. The soil from the excavated trench is hauled to a nearby location where it is mixed with hydrated bentonite to reduce permeability and cement in some applications where increased strength is desired. The soil-bentonite mixture then is returned to the levee and backfilled into the trench. This mixture hardens and creates the impermeable barrier wall in the levee.

In most cases, degradation of the levee crown is necessary to create a large enough working platform to reduce the risk of hydraulic fracturing from the insertion of slurry fluids, and allowing greater depths to be reached. Dependent on the conditions of the particular levee, it may be necessary to degrade the levee by one- to two-thirds its existing height. The material

from degrading the levee is hauled to a nearby stockpile area. Following completion of the slurry cutoff wall, the material is hauled back to the levee to restore the levee to its original dimensions. The material may need to be hauled offsite to a local landfill, and borrow material may need to be imported if the in-situ levee material is found to be unsuitable for current levee standards.

One construction crew typically is able to construct 75–100 linear feet of slurry wall (about 70–80 feet deep) in an 8-hour shift. Equipment needed for the crew includes a long-reach track hoe, three or four dump trucks (15 cubic yard capacity each), two loaders at the mixing location, bulldozers, excavators, loaders, a rough terrain forklift, compactors, maintainers, and a water truck. Vertical clearance of about 40 feet is needed for the excavator boom. Horizontal clearance of about 30 feet beyond the levee crest may be required for excavator swing when loading dump trucks.

A mixing area is located at the construction staging area. The mixing area is to prepare the soil-bentonite mixture and supply bentonite-water slurry. The mixing area is contained to avoid inadvertent dispersal of the mixing materials. Dump trucks haul material between the excavator and the mixing area along the levee.

An access road made of aggregate base rock is constructed on the levee crown to enable regular levee inspections. Post-construction, areas used for construction staging, mixing, the levee crown, slopes, and any other disturbed areas are hydroseeded.

Deep Soil Mixing Method - The DSM method of constructing a slurry cutoff wall uses a crane-supported set of two to four mixing augers (typically 36 inches in diameter) set side by side. These augers are drilled through the levee crown and foundation to the required depth (capable of a maximum depth of about 200 feet). As the augers are inserted and withdrawn, a soil-bentonite grout is injected through the augers and mixed with the native soil. An overlapping series of mixed columns is drilled to create a continuous seepage cutoff barrier.

To provide a wide enough working platform on the levee crown, the upper portion of some segments of the levee requires excavation with a paddle wheel scraper. Material is scraped and stockpiled at a nearby stockpile area. Dependent on the depth of the wall required, vertical clearance for the crane also may be needed. An excavator manipulates injector return spoils near the DSM rig, and transport trucks are used to haul spoils offsite. A crane is used for in-place sampling of DSM material and also for loading bentonite into the batch plant hopper. A mobile batch plant (diesel-powered) is required near each DSM rig at the work area to prepare the cement-bentonite grout. The grout is transported to the DSM rig through flexible hoses. Each batch plant requires a pad of 50 by 100 feet. Hauling at the work area involves scraper runs along the levee to the staging area and cement and bentonite deliveries to the batch plant.

During DSM slurry wall construction, one DSM rig typically can construct 50 linear feet of DSM wall per 8-hour shift (for wall depths up to 135 feet). Post-construction, areas used for construction staging, the levee slopes, and any other disturbed areas are hydroseeded.

Jet Grouting Method - Jet grouting involves injecting fluids or binders into the soil at very high pressure. The injected fluid can be grout; grout and air; or grout, air, and water. Jet grouting breaks up soil and, with the aid of a binder, forms a homogenous mass that solidifies over time to create a mass of low permeability. Jet grouting typically is used in constructing a slurry cutoff wall to access areas other methods cannot. In this regard, it is typically a spot application rather than a treatment to be applied on a large scale along an entire reach.

Equipment required for jet grouting consists of a drill rig fitted with a special drill string; a high pressure, high flow pump; and an efficient batching plant with sufficient capacity for the required amount of grout and water. The high-pressure pump conveys the grout, air, and/or water through the drill string to a set of nozzles located just above the drill bit. The diameter of the jet grout column is dependent on site-specific variables such as soil conditions, grout mix, nozzle diameter, rotation speed, withdrawal rate, and grout pressure. Jet grouted columns range from 1 to 16 feet in diameter and are typically interconnected to form cutoff barriers or structural sections. Under ideal conditions, one construction crew—consisting of a site supervisor, pump operator, batch plant operator, chuck tender, and driller—can construct two 6-foot diameter, 50-foot columns per day consisting of about 100 cubic yards of grout injected per 8-hour shift. Ideal conditions will be characterized by no technical issues occurring at either the batch plant or the drilling site, such as loss of fluid pressure, breakdown of equipment, or subsurface obstructions to drilling operations.

To initiate jet grouting, a borehole is drilled through the levee crown and foundation to the required depth (to a maximum depth of about 130 feet) by rotary or rotary-percussive methods using water, compressed air, bentonite, or a binder as the flushing medium. When the required depth is reached, the grout is injected at a very high pressure as the drill string is rotated and slowly withdrawn. Use of the double, triple, and superjet systems create eroded spoil materials that are expelled out of the top of the borehole, this material is frequently used as a construction fill.

To provide a wide enough working platform on the levee crown, the upper portion of some segments of the levee may require degradation with a paddle wheel scrapper. Material is scraped and stockpiled at a nearby stockpile area. Hauling at the work area involves scraper runs along the levee to the staging area and grout, bentonite, and water deliveries to the batch plant.

Batch plants are typically centrally located to the injection site, with pipelines for mixed grout that run the length of the work. Grout mixing and injection equipment consists of grout mixers, high powered grout pumps and supporting generators and air compressors, holding tanks, and water tanks, with bulk silos of grout typically used to feed large mixers. Smaller equipment can be used in combination with the single phase-fluid system and can be permanently trailer-mounted to permit efficient mobilization and easy movement at the job site.

Prior to commencing production jet grouting, a field test program is typically completed to evaluate injection parameters and to assess jet grout column geometries, and mechanical and permeability properties. Where possible, jet grout test elements are exposed by excavation and properties are obtained by direct measurement. Where excavation is not possible, core drilling is employed to obtain samples from the jet grout test columns for strength testing.

Areas used for construction staging, the levee slope, and any other disturbed areas are restored and hydroseeded following construction.

Slope Flattening

Slope flattening is a mechanical method to repair or reshape slopes that do not meet standards for geometry and stability. Levee slopes are typically subject to a standard of 3:1 (horizontal to vertical), but this may vary based on site-specific conditions and supporting engineering analysis. Slope flattening addresses the deficiency of slope stability and geometry. To begin slope flattening activities, the area is cleared, grubbed, and stripped to provide space for construction and reshaping of slopes. Additional embankment fill material may be necessary to achieve slope flattening—if so, bulldozers excavate and stockpile borrow material from a nearby permitted borrow site. Front-end loaders load haul trucks with the borrow material. The haul trucks transport the material to slope flattening site. Motor graders spread material evenly according to levee design plans, and sheepsfoot rollers compact the material. Water trucks distribute water over the material to ensure proper moisture for compaction.

To reshape a waterside slope, the existing crown of the levee is shifted farther landward and the waterside slope is trimmed and reshaped to a 3:1 slope. The shifted levee crown will be a minimum of 20 feet wide, with a 3:1 slope on the landward side. An access road made of aggregate base rock is constructed on the levee crown. Post-construction, the construction staging areas, levee slopes, and any other disturbed areas will be hydroseeded.

Stability Berm

A stability berm will be constructed against the landside slope of the existing levee with the purpose of supplying support as a buttress. The height of the stability berm is generally two-thirds the height of the levee; the structural needs of the levee determine the distance it extends along that reach. A stability berm addresses the deficiency of stability. To begin the construction of a stability berm, the site is cleared, grubbed, and stripped to provide space for construction and shaping of the berm. Embankment fill material necessary to construct the berm is excavated by a bulldozer from a nearby borrow site. Front-end loaders load haul trucks with the borrow material, and the haul trucks transport the material to the stability berm site. Motor graders spread the material evenly according to design specifications, and a sheepsfoot roller compacts the material. Water trucks distribute water over the material to ensure proper moisture for compaction.

Stability berms may be drained or undrained. An undrained berm consists of embankment fill only. A drained berm includes a layer of drain rock placed along the ground surface underneath the fill material, separated by a casing of filter fabric. Drainage water seeping from the berm will sheetflow on the adjacent landside surface.

Levee Reconstruction

Levee reconstruction will be necessary where a levee has been degraded to facilitate implementation of another measure (such as a slurry cutoff wall), where a substantial

encroachment has been removed from within the levee prism, or otherwise where the levee is found to be deficient and needs to be replaced with materials and methods that meet current engineering standards. The existing levee is first cleared, grubbed, and stripped to the desired surface to allow a working platform for other measures (such as a slurry cutoff wall), to remove an encroachment, or to remove substandard material. Embankment fill material necessary to construct the new levee is excavated by a bulldozer from a nearby borrow site. Front-end loaders load haul trucks with the borrow material and the haul trucks transport the material to the stability berm site. Motor graders spread the material evenly according to design specifications, and a sheepsfoot roller compacts the material. Water trucks distribute water over the material to ensure proper moisture for compaction. The new levee will be built in cross section to meet current engineering standards.

Sheet-Pile Wall

A sheet-pile wall is a series of vertical panels of interlocking steel that is placed parallel to the levee, typically through the center of the levee crown to provide an impermeable barrier. A sheet-pile wall addresses the deficiencies of seepage and will be used only as a site-specific treatment (rather than applied on a reach-wide basis) such as at roadway or railroad crossings. The site where sheet piles are to be installed is cleared, grubbed, and stripped to allow for construction activities, including removal of the roadway or railroad. A hydraulic- or pneumatically-operated pile-driving head attached to a crane drives the sheet pile into the levee crown to the desired depth (up to 135 feet). If the levee material is particularly solid, pre-drilling may be necessary. The conditions of the site and the desired life of the project determine the thickness and configuration of the sheet piles.

Post-construction, construction staging areas, the levee crown, slopes, and any other disturbed areas are hydroseeded and the roadway or railroad will be replaced in-kind to the pre-project condition.

Seepage Berm

Seepage berms are wide embankment structures made up of low-permeability materials that resist accumulated water pressure and safely release seeping water. A seepage berm is typically one-third the height of the levee, extending outward from the landside levee toe for 300–400 feet, and laterally along the levee as needed relative to the seepage conditions. A seepage berm addresses the deficiency of under-seepage. A seepage berm can vary in width, from a minimum of four times the levee height to a maximum of 300 feet. Berm heights can also vary but are typically a minimum of 5 feet tall at the landside toe of the levee and generally taper down to 3 feet at the end of the berm.

Construction consists of clearing, grubbing, and stripping the ground surface. Bulldozers then excavate and stockpile borrow material from a nearby borrow site. Front-end loaders load haul trucks, and the haul trucks subsequently transport the borrow material to the berm site. The haul trucks dump the material and motor graders spread it evenly, placing 3–5 feet of embankment fill material. Sheepsfoot rollers compact the material, and water trucks distribute water over the material to ensure proper moisture for compaction.

Seepage berms may have an optional feature of a drainage relief trench under the toe of the berm. Drained seepage berms include the installation of a drainage layer (gravel or clean sand) beneath the seepage berm backfill and above the native material at the levee landside toe. A drained seepage berm does not increase the overall footprint of the berm. Post-construction, areas used for construction staging, the levee, the berm, and any other disturbed areas are hydroseeded.

Relief Wells

Relief wells are passive systems that are constructed near the levee landside toe to provide a low-resistance pathway for under-seepage to exit to the ground surface in a controlled and observable manner. A low-resistance pathway allows under-seepage to exit without creating sand boils or piping levee foundation materials. Relief wells are an option only in reaches where geotechnical analyses have identified continuous sand and gravel layers. Relief wells are constructed using soil-boring equipment to drill a hole vertically through the fine-grained blanket layer (sand) into the coarse-grained aquifer layer (gravel) beneath. Pipe casings and gravel/sand filters are installed to allow water to flow freely to the ground surface, relieving the pressure beneath the clay blanket without transporting fine materials to the surface, which can undermine the levee foundation. Relief wells will be designed to discharge onto a cobble splash, and the water will then sheet flow into adjacent agricultural fields. In areas where sheet flow is not feasible, a swale will be excavated and connected to a drainage canal.

Relief wells generally are spaced at 50- to 100-foot intervals, dependent upon the amount of under-seepage, and extend to depths of 150 feet. Areas for relief well construction are cleared, grubbed, and stripped. During relief well construction, a typical well-drilling rig is used to drill to the required depth and construct the well (including well casing, gravel pack material, and well seal) beneath the ground surface. The drill rig likely will be an all-terrain, track-mounted rig that could access the well locations from the levee toe.

Piezometers, also called monitoring wells, could be installed between relief wells to allow monitoring of groundwater levels to ensure the wells are relieving the pressure within the aquifer.

Areas along the levee toe may be used to store equipment and supplies during construction of each well. Construction of each well and the lateral drainage system typically takes 10–20 days. Additional time may be required for site restoration. Post-construction, areas used for construction staging, the levee slopes, and any other disturbed areas are hydroseeded.

Depression/Ditch Infilling

Landside depressions and ditches can contribute to risk of levee failure if a seepage pathway forms under the levee and the water then surfaces through the depression or ditch, exploiting its less resistive nature compared to surrounding soil mass. This measure involves placing fill soil in such depressions and ditches to remove localized susceptibility to seepage. Construction consists of clearing, grubbing, and stripping the ditch or depression surface to remove vegetative material. Bulldozers then excavate and stockpile borrow material from a nearby borrow site.

Front-end loaders load haul trucks, and the haul trucks subsequently transport the borrow material to the fill site. The depression or ditch may be further excavated to provide a surface that the fill soil may be keyed into. The haul trucks dump the material and motor graders or bulldozers smooth the material level with the surrounding land surface. An excavator may also be used for placement. Sheepsfoot rollers compact the material, and water trucks distribute water over the material to ensure proper moisture for compaction.

Removal and Relocation of Pacific Gas & Electric Facilities

Prior to and/or concurrent with levee rehabilitation construction, Pacific Gas and Electric Company (PG&E) will need to remove and relocate facilities located within the footprint of the FRWLP. PG&E's utility relocations will need to occur in advance of SBFCA's construction activities at any given location. Construction sequencing for SBFCA's work will be dynamic throughout SBFCA's project planning and design. PG&E's construction schedule will be determined by further engineering to clarify and determine efficacy of site-specific measures; the availability of funding for FRWLP; easement and right-of-way acquisition; availability of borrow material for the levee improvement activities; and/or environmental clearances based on wildlife presence, lifecycle activity, and location of habitats. PG&E's construction schedule will be further influenced by utility operation and maintenance constraints, particularly for relocation activities that require taking existing facilities temporarily out of service. As necessary, geotechnical mitigation measures will be incorporated into construction design to ensure that utility facilities effectively co-exist with the FRWLP, relocation will be done where this is not feasible.

For PG&E's electrical transmission and distribution activities, PG&E will install and remove new electrical transmission and distribution poles. Electrical transmission and distribution pole removal is conducted by a line crew, who typically access each pole site with a line truck and trailer or a boom truck, except in those instances when the pole is located on the levee crown (a crane may be used in those instances). On average, removal of vegetation up to 50 feet from the toe of the levee will need to occur to accommodate pole installation activities; this distance may be greater in instances where the installation activity is located further than 30 feet from the levee toe. After vegetation is cleared, PG&E will remove and replace the existing wood distribution and power poles and related equipment.

For PG&E's natural gas transmission and distribution activities, PG&E will install gas transmission and distribution steel pipe. This also typically includes the removal and disposal of existing pipe. Other typical types of gas transmission and distribution equipment that may be installed include Electric Test System/ Gas Cathodic Test System meter stations for future pipe monitoring purposes, and pipeline markers at angle points and at levee crossing locations. Clearing and grading operations in support of installation of natural gas facilities typically involve preparation of the right-of-way, including vegetation removal, debris disposal, and land leveling. Installation sites are backfilled using sand to create a 6-inch insulation zone around the pipe and then covered by native soil from the project area. In some instances, a crane may be required to place pipe at crossing sites located at the crowns of the levees. Dump trucks will be used to transport sand and soil materials. Spoil piles may be temporarily placed onsite while the installation activities are occurring.

Hydrostatic testing associated with installation of natural gas facilities will be performed to test the strength of the new pipeline. Test water intake and discharge will be performed in accordance with all regulations and permit requirements.

Typical electrical and natural gas transmission and distribution project work schedules are comprised of an average 9-hour day, at an average of 6 days per week per crew. Typical crews consist of 3 to 5 members.

PG&E work areas will be about 125 feet by 125 feet in diameter and located in close proximity to installation activity locations. On average, PG&E will require up to 10 work areas per contract phase. PG&E will utilize the work areas identified by SBFCA whenever possible. Typically, PG&E project access is achieved through existing public and private roads. Removal of vegetation to utilize access roads by PG&E equipment and transport of facilities may be required. PG&E currently owns easements along the entire project corridor. However, temporary and/or permanent easements as required for construction and maintenance of these facilities are being acquired by SBFCA.

Encroachment and Vegetation Removal

Encroachments - Existing facilities found within the footprint of an alternative may require removal and replacement nearby, abandonment, or relocation. Encroachments are numerous (over 400 identified) along the Feather River West Levee and may need to be addressed if they present a threat to the stability of the levee, do not currently comply with the levee encroachment criteria, or will be disrupted or otherwise impacted by construction activities. Typical encroachments include pressure pipelines (water supply pipelines from waterside pump stations and drainage pipelines from landside drainage pump stations), gravity drainage pipes, gas lines, telephone utilities, overhead utilities, structural encroachments, and other types and variations. Debris from structure and embankment fill material of poor quality will be hauled offsite to a permitted disposal site within 20 miles of the removal location.

Vegetation Removal - Vegetation removal will involve stripping of herbaceous (non-woody) vegetation by bulldozer. Vegetation will be removed only from within the direct construction footprint and the minimum areas necessary for staging and access. Consistent with the Central Valley Flood Protection Plan guidance for levee repair or improvement, vegetation will be removed to meet specific project objectives. Any vegetation removed as part of direct construction activities will not be replaced at that location, but will involve offsite, in-kind mitigation, to be determined in consultation with the appropriate resource agencies.

In accordance with the State of California's Urban Levee Design Criteria, at a minimum, all roots larger than 1.5 inches in diameter that are within 3 feet of the perimeter of the tree trunk will be removed. Immature trees less than 4 inches in diameter at breast height that will be removed may be cut off at or below ground level, generally without root removal. Any excavation will be

backfilled with engineered fill using appropriate placement, moisture conditioning, and compaction methods. Additional measures for removing non-compliant vegetation are listed below.

- Ensure that the resulting void is free of organic debris.
- Cut poles to salvage propagation materials for replanting, such as willows and cottonwoods.
- Conduct hand clearing using chainsaws and trimmers.
- Conduct mass clearing using bulldozers.

Debris from vegetation removal will be hauled offsite to a permitted disposal site within 20 miles of the removal location.

Construction Staging, Access, and Temporary Facilities

Staging areas will only be provided within the Action Area. Staging areas will be used for staging construction activities and to provide space to house construction equipment and materials, offices, employee parking, and other uses needed for construction of the proposed project.

To facilitate construction, temporary earthen ramps will be constructed for equipment access between the levee crown and the staging area(s). The earthen ramps will be removed when construction is complete.

Cutoff wall construction requires temporary establishment of an onsite slurry batch plant that will occupy about 1–2 acres. Batch plants will be located at about 1-mile intervals along the levee. The batch plant site will likely contain tanks for water storage, bulk bag supplies of bentonite, bentonite storage silos, a cyclone mixer, pumps, and two generators that meet air quality requirements. Slurry ingredients will be mixed with water and the mixture will be pumped from tanks through pipes to the construction work sites. The batch plant will produce two different slurry mixes, one for trench stabilization and one for the soil backfill mix. Therefore, two slurry pipes or hoses, typically 4- or 6-inch high-density polyethelene pipes, will be laid on the ground and will extend to all work sites. An additional pipe may be used to supply water to the work sites.

Staging, access, and other temporary construction areas will be located away from wetlands, woody vegetated areas, wildlife species habitat, known cultural resources, or other sensitive areas and will be limited to disturbed or ruderal grasslands subject to review by Corps and resource agencies.

Material Importation, Reuse, and Borrow

Materials imported to the FRWLP construction area will include water, bentonite, cement, incidental construction support materials, aggregate base rock, asphalt, concrete, hydroseed, and embankment fill soil. Large quantities of fill soil, or borrow will be required. To meet borrow demands, embankment fill material excavated as part of construction will be evaluated for reuse. Embankment fill material deemed suitable will be used as part of levee reconstruction and berms. The total volume of material required is 1,500,000 cubic yards.

SBFCA has explored the option of purchasing fill or borrow material from a local commercial quarry or other permitted source; however, there are not currently any sites near the Action Area that could supply the volume and type of material required. Consequently, SFBCA plans to purchase fill from local landowners willing to sell borrow material.

Six borrow sites have been identified in the Action Area. Each site was investigated to determine the quantity of available material, hauling distance, material composition, groundwater elevation, and prospects for acquisition. Sufficient fill volume is estimated to be present within an approximate 10-mile, one-way haul distance from the area of construction.

SBFCA will maximize the potential borrow sites' use through gradation, placement, and treatment so that they could continue to be used for their current use or otherwise returned to their pre-project condition. As part of borrow operations, the upper 4–6 inches of topsoil will be set aside and replaced after construction in each construction season. After the FRWLP is completed, the borrow site will be re-contoured and reclaimed.

Through outreach efforts, SBFCA identified a number of sites owned by individuals or government agencies willing to sell their property or provide material on a cubic yard basis. Each borrow site is described below.

North Valley Property - The North Valley property is owned by North Valley Properties, LLC and is located south of Ella Road between Feather River Boulevard and Arboga Road. The Wheeler Ranch housing development is proposed at the site. Borrow for the FRWLP will be taken from the northeast corner of the property to create a 24.5 acre detention pond (referred to as the Drainage Basin C Regional Detention Pond, but commonly referred to as the South Ella Detention Pond). The Ella Basin is being constructed as part of Reclamation District No. 784's Master Drainage Plan. Historically, the site was cultivated for agricultural purposes. Currently, the site is disked ruderal grassland with some roads cut in the southern portion of the property for the Wheeler Ranch development. The depth of excavation is anticipated to be 15–20 feet and the yield of material from this site could be 400,000–500,000 cubic yards. Borrow material from this site will be used for work in Contracts B and C. If borrow material is remaining, it may also be used for Contract D. The haul route to Contract C will use existing roads. The post-project land use of the site will be a regional detention pond for Reclamation District No. 784.

Marler Property - The Marler property is a 10-acre property at Johnson Road near Messick Road, north of Star Bend and south of Shanghai Bend. The site is currently an orchard. The depth of

excavation could be upwards of 6 feet. The yield of material from this site could be 75,000 cubic yards. The haul route will use existing roads. The post-project land use for the property will be agricultural production, likely row crops or orchard.

Lanza Property - The Lanza property is 40 acres in size and is currently farmed in field/row crops. It is located at North Township Road and Pease Road south of Live Oak and north of Yuba City. The site has not yet been investigated to determine the types of materials present. Excavation of the site to a depth of 6 feet may occur. The yield of material from this site could be 200,000 cubic yards. The likely haul route will be along Pease Road directly east to the levee. The post-project land use for the property will be rice production.

City of Live Oak Detention Basin - Live Oak owns the property formerly known as the Caltrans Detention Basin Site located west of SR 99 and south of Paseo Avenue. The site is currently fallow. Live Oak intends to construct soccer fields and a stormwater detention basin at the site in 2013 or later. Although the site will require hauling for a short distance through a residential neighborhood, it is anticipated the residents will be amenable to the hauling as it will be a part of the public amenity constructed by Live Oak. This site is about 25 acres, and the depth of excavation is anticipated to be 3–6 feet. The yield of material from this site could be 125,000 cubic yards, and will likely be used for Contract C. Haul routes will use existing roads.

Live Oak (2012) reports that land at this location has historically been cultivated for agricultural purposes and reported that there was no evidence of any wetland or other sensitive plant or wildlife areas remaining onsite. No wetland features were identified during a preliminary wetland delineation of the area in December 2012. The previous agricultural use has displaced native species of plants and animals except those varieties capable of co-existing with humans in urban settings. The post-project use of the site will be a community park and stormwater detention basin facility.

Oroville Wildlife Area Dredge Tailings Area - This site is within the Oroville Wildlife Area and consists of several mounds of dredge tailings waterside of the existing levee. The material is suitable for use in seepage berms in Contract D. The availability of tailings in the area should be sufficient to meet the total deficit for berm material in these reaches. The excavation of the material will be coordinated to maximize hydraulic benefits from the reshaping of the overbank area. The site also represents an opportunity to provide waterside habitat enhancements. The useful area of this site could be about 75 acres and the depth of excavation could be upwards of 10 feet. The yield of material from this site could be 375,000 cubic yards. Hauling from this site will not take place on public roads. It is anticipated the contractor will use an existing waterside levee ramp (or create one), directly accessing the levee patrol road. The future land use for this site will be similar to its present day use (managed habitat area).

Construction Timing

Specific sequencing of construction will be dynamic throughout planning and design of the FRWLP, subject to change based on factors including the following.

- Further engineering in determining the clarity and efficacy of site-specific measures.

- Easement and right-of-way acquisition (where necessary).
- Availability of proximate, suitable, and cost-effective borrow material.
- Environmental clearances based on wildlife presence, lifecycle activity, and location of habitats.

Based on current planning analysis for the FRWLP, construction will occur in more than one annual construction season (typically April 15 to November 30, subject to conditions). Although subject to change, the four contracts and their respective areas for construction of the FRWLP are identified below.

- Contract A, 2016 – 2017
- Contract B, 2014 – 2015
- Contract C, 2013 – 2014
- Contract D, 2014 – 2015

Construction is anticipated to occur in single 10-hour shifts, 6 days per week. An exception to this schedule is slurry cutoff wall construction, which is anticipated to occur in two 10-hour shifts (essentially 24-hour construction), 6 days per week. While actual construction will not occur between the two 10-hour shifts, equipment maintenance and preparations for the upcoming work shift will occur.

Conservation Measures

SBFCA will implement the following conservation measures to avoid and minimize effects on federally listed species. To ensure their implementation, the measures listed below will be included in the project specifications.

General

Conservation Measure 1: Conduct Mandatory Biological Resources Awareness Training for All Project Personnel and Implement General Requirements

Before any ground-disturbing work (including vegetation clearing and grading) occurs in the Action Area, a Service-approved biologist will conduct a mandatory biological resources awareness training for all construction personnel about federally-listed species that could potentially occur onsite (beetle and snake). The training will include the natural history, representative photographs, and legal status of each federally-listed species and avoidance and minimization measures to be implemented. Proof of personnel attendance will be provided to the Service within 1 week of the training. If new construction personnel are added to the project, the contractor will ensure that the new personnel receive the mandatory training before starting work. The subsequent training of personnel can include videotape of the initial training and/or the use of written materials rather than in-person training by a biologist. Requirements that will be followed by construction personnel are listed below.

- Where suitable habitat is present for listed species, SBFCA will clearly delineate the construction limits through the use of survey tape, pin flags, orange barrier fencing, or other means, and prohibit any construction-related traffic outside these boundaries.
- Project-related vehicles will observe the posted speed limit on hard-surfaced roads and a 10-mile-per-hour speed limit on unpaved roads during travel in the project construction area. Project-related vehicles and construction equipment will restrict off-road travel to the designated construction areas.
- All food-related trash will be disposed of in closed containers and removed from the project construction area at least once per week during the construction period. Construction personnel will not feed or otherwise attract fish or wildlife to the project site.
- No pets or firearms will be allowed in the project construction area.
- To prevent possible resource damage from hazardous materials such as motor oil or gasoline, construction personnel will not service vehicles or construction equipment outside designated staging areas.
- Any worker who inadvertently injures or kills a federally-listed species or finds one dead, injured, or entrapped will immediately report the incident to the biological monitor and construction foreman. The construction foreman will immediately notify SBFCA, who will provide verbal notification to the Sacramento Fish and Wildlife Office and the local CDFW warden or biologist within 1 working day. SBFCA will follow up with written notification to Service and CDFW within 5 working days. The biological monitor will follow up with SBFCA to ensure that the wildlife agencies were notified.
- The biological monitor will record all observations of federally-listed species on California Natural Diversity Database (CNDDB) field sheets and submit to CDFW.

Valley Elderberry Longhorn Beetle

Conservation measures for the beetle are based on Service's 1999 *Conservation Guidelines for the Valley Elderberry Longhorn Beetle* (Conservation Guidelines) (U.S. Fish and Wildlife Service 1999a).

Conservation Measure 2: Fence Elderberry Shrubs to be Protected and Monitor Fencing during Construction

Elderberry shrubs/clusters within 100 feet of the construction area that will not be removed will be protected during construction. A qualified biologist (i.e., with elderberry/beetle experience), under contract to SBFCA, will mark the elderberry shrubs and clusters that will be protected during construction. Orange construction barrier fencing will be placed at the edge of the respective buffer areas. The buffer area distances will be proposed by the biologist and approved by the Service. No construction activities will be permitted within the buffer zone other than those activities necessary to erect the fencing. Signs will be posted every 50 feet (15.2 meters) along the perimeter of the buffer area fencing. The signs will contain the following information:

This area is habitat of the valley elderberry longhorn beetle, a threatened species, and must not be disturbed. This species is protected by the Endangered Species Act of 1973, as amended. Violators are subject to prosecution, fines, and imprisonment.

In some cases, where the elderberry shrub dripline is within 10 feet of the work area, k-rails will be placed at the shrub's dripline to provide additional protection to the shrub from construction equipment and activities. Temporary fences around the elderberry shrubs and k-rails at shrub driplines will be installed as the first order of work. Temporary fences will be furnished, constructed, maintained, and later removed, as shown on the plans, as specified in the special provisions, and as directed by the project engineer. Temporary fencing will be 4 feet (1.2 meters) high, commercial-quality woven polypropylene, orange in color.

Buffer area fences around elderberry shrubs will be inspected weekly by a qualified biological monitor during ground-disturbing activities and monthly after ground-disturbing activities until project construction is complete or until the fences are removed, as approved by the biological monitor and the resident engineer. The biological monitor will be responsible for ensuring that the contractor maintains the buffer area fences around elderberry shrubs throughout construction. Biological inspection reports will be provided to the project lead and the Service.

Conservation Measure 3: Conduct Beetle Surveys Prior to Elderberry Shrub Transplantation

Surveys of elderberry shrubs to be transplanted will be conducted by a qualified biologist prior to transplantation. Surveys will be conducted in accordance with the Conservation Guidelines (U.S. Fish and Wildlife Service 1999a). The biologist will survey the area surrounding the shrub to be transplanted to ensure that there are not additional elderberry shrubs that need to be removed. Surveys will consist of counting and measuring the diameter of each stem, and examining elderberry shrubs for the presence of beetle exit holes. Survey results and an analysis of the number of elderberry seedlings/cuttings and associated native plants based on the survey results will be submitted to the Service. SBFCA plans to plant elderberry seedlings/cuttings and associated native plants prior to transplantation of elderberry shrubs. The data collected during the surveys prior to transplantation will be used to determine if SFBCA is exceeding their compensation needs or if additional plantings are necessary. Because the Proposed Action will be constructed in four separate contracts, elderberry survey data for each contract will be used to rectify any discrepancies in compensation for the previous contract and to ensure that SBFCA has minimized effects to the beetle.

Conservation Measure 4: Water Down Construction Area to Control Dust

SFBCA or the contractor will ensure that the project construction area will be watered down as necessary to prevent dirt from becoming airborne and accumulating on elderberry shrubs within the 100–foot buffer.

Conservation Measure 5: Compensate for Direct and Indirect Effects on Valley Elderberry Longhorn Beetle Habitat

Before construction begins, SBFCA will compensate for direct effects on elderberry shrubs by transplanting shrubs that cannot be avoided to a Service-approved conservation area (described below). Elderberry seedlings or cuttings and associated native species will also be planted in the conservation area. Each elderberry stem measuring 1 inch or greater in diameter at ground level that is adversely affected (i.e., transplanted or destroyed) will be replaced, in the conservation

area, with elderberry seedlings or cuttings at a ratio ranging from 1:1 to 8:1 (new plantings to affected stems). The numbers of elderberry seedlings/cuttings and associated riparian native trees/shrubs to be planted as replacement habitat are determined by stem size class of affected elderberry shrubs, presence or absence of exit holes, and whether the shrub lies in a riparian or non-riparian area. Stock of either seedlings or cuttings will be obtained from local sources (including the Action Area if acceptable to the Service).

At the discretion of the Service, shrubs that are unlikely to survive transplantation because of poor condition or location, or a plant that will be extremely difficult to move because of access problems, may be exempted from transplantation. In cases where transplantation is not possible, compensation ratios will be increased to offset the additional habitat loss.

The relocation of the elderberry shrubs will be conducted according to Service-approved procedures outlined in the Conservation Guidelines (U. S. Fish and Wildlife Service 1999a). Elderberry shrubs within the project construction area that cannot be avoided will be transplanted during the plant's dormant phase (November through the first 2 weeks of February). A qualified biological monitor will remain onsite while the shrubs are being transplanted.

Property inaccessibility and the high density of vegetation along portions of the Feather River riparian corridor limited the number of elderberry shrubs that could be surveyed (73 shrubs were surveyed). For this reason, compensation for the removal of 91 shrubs was estimated based on the average number of stems in each stem diameter range for the 73 shrubs that could be surveyed. Those average shrub stem counts are as follows.

- Number of stems $\geq$1 inch and $\leq$3 inches = 4.
- Number of stems >3 inches and <5 inches = 1.
- Number of stems $\geq$5 inches = 1.

Table 1 shows the estimated compensation. Because the shrubs are located in riparian habitat and did not have exit holes, the compensation ratios for these conditions were used. As noted in Table 1, one elderberry shrub will need to be transplanted prior to the start of work in 2013 (in Reach 13) and outside of the elderberry dormancy period.

Based on the information in Table 1, the conservation area will be at least 12.15 acres in size to accommodate about 91 elderberry shrubs, 1,470 elderberry cuttings or seedlings, and 1,470 native plants. The conservation area in which the transplanted elderberry shrubs and seedlings are planted will be protected in perpetuity as habitat for the beetle.

Evidence of beetle occurrence in the conservation area, the condition of the elderberry shrubs in the conservation area, and the general condition of the conservation area itself will be monitored over a period of 10 consecutive years or for 7 years over a 15-year period from the date of transplanting. SBFCA will be responsible for funding and providing monitoring reports to the Service in each of the years in which a monitoring report is required. As specified in the Conservation Guidelines, the report will include information on timing and rate of irrigation, growth rates, and survival rates and mortality.

Table 1. Elderberry Stem Sizes and Compensation

Location	Stems (maximum diameter at ground level)	Exit Hole on Shrub (Yes or No)	Elderberry Seedling Ratio	Associated Native Plant Ratio	Multiplier for transplanting between June 15 – August 15	Number of Stems	Required Elderberry Plantings	Required Associated Native Plant Plantings
Riparian	stems ≥1" & ≤3"	No	2:1	1:1	No	360	720	720
Riparian	stems > 3" & <5"	No	3:1	1:1	No	90	270	270
Riparian	stems > 5"	No	4:1	1:1	No	90	360	360
2013 Construction - Reach 13								
Riparian	stems ≥1" & ≤3"	No	2:1	1:1	2.5	1	5	5
Riparian	stems > 3" & <5"	No	3:1	1:1	2.5	2	15	15
Riparian	stems > 5"	No	4:1	1:1	2.5	10	100	100
Total replacement plantings							1,470	1,470
Total elderberry shrubs to be transplanted								91
2940 /10 = 294 valley elderberry longhorn beetle credits or 12.15 acres								

To meet the success criteria specified in the Conservation Guidelines, a minimum survival rate of 60% of the original number of elderberry replacement plantings and associated native plants must be maintained throughout the monitoring period.

Proposed Conservation Area

SBFCA proposes to transplant elderberry shrubs to the existing 48.5-acre Star Bend Conservation Area, located on the west levee of the Feather River, about 6 miles south of Yuba City. In 2009, Levee District 1 of Sutter County proposed to construct the Feather River Setback Levee and Habitat Enhancement Project at Star Bend to replace a portion of existing levee that poses a high risk of failure in order to decrease the flood stage, velocity, and scour potential; increase and improve floodplain habitat; and improve habitat connectivity between the Abbot Lake and O'Connor Lakes Units of CDFW's Feather River Wildlife Area. The Star Bend project created 48.5 acres of floodplain habitat, which included habitat enhancement and onsite compensation for impacted elderberry shrubs.

In 2009, River Partners and Stillwater Sciences prepared a *Habitat Enhancement Plan for the Feather River Setback Levee and Habitat Enhancement Project at Star Bend* to be implemented by Levee District 1. It provides further information on the conditions at the time the site was proposed. About 20 acres have been used for elderberry transplants and associated native plants. In early 2012, a fire at the Star Bend site damaged portions of the site; however, elderberry shrub

planting losses were minimal. The remaining 28.5 acres are available at the conservation area for compensating for impacts on elderberry shrubs from construction of the FRWLP. The long-term goal of the conservation area is to merge this area with CDFW's adjoining O'Conner Lakes and Abbott Lakes Wildlife Units. SBFCA will prepare a mitigation and monitoring plan for the 28.5 acres that are available and will be used as a conservation area for effects to the beetle, as well as riparian impacts. This plan is currently being coordinated with the Service, Corps, and CDFW. Additionally, SBFCA will obtain a conservation easement for the 28.5 acre conservation area.

Giant Garter Snake

Conservation Measure 6: Conduct Construction Activities during the Active Period for Giant Garter Snake

Construction activity within giant garter snake aquatic and upland habitat (200 feet of aquatic habitat) will be conducted during the snake's active period (May 1–October 1). During this timeframe, potential for injury and mortality are lessened because snakes are actively moving and avoiding danger. The only work that will be conducted outside of the active season is levee slope flattening within the Sutter-Butte Canal in Reaches 26–28 (scheduled for 2016) and pipe reconstruction at two sites in the same reaches because these activities must be conducted when the canal is dry (February–March). Additional protective measures will be implemented at these locations (see Conservation Measure 14 below).

Conservation Measure 7: Install and Maintain Exclusion and Construction Barrier Fencing around Suitable Giant Garter Snake Habitat

To reduce the likelihood of giant garter snakes entering the construction area, SBFCA will install exclusion fencing and orange construction barrier fencing along the portions of the construction area that are within 200 feet of suitable aquatic and upland habitat. The exclusion and construction barrier fencing will be installed during the active period for giant garter snakes (May 1–October 1) to reduce the potential for injury and mortality during this activity.

The construction specifications will require that SBFCA or its contractor retain a qualified biologist to identify the areas that are to be avoided during construction. Areas adjacent to the directly affected area required for construction, including staging and access, will be fenced off to avoid disturbance in these areas. Before construction, the contractor will work with the qualified biologist to identify the locations for the barrier fencing and will place flags or flagging around the areas to be protected to indicate the locations of the barrier fences. The protected area will be clearly identified on the construction specifications. The fencing will be installed the maximum distance practicable from the aquatic habitat areas and will be in place before construction activities are initiated.

The exclusion fencing will consist of 3-foot-tall silt fencing buried 6 inches below ground level. The exclusion fencing will ensure that giant garter snakes are excluded from the construction area and that suitable upland and aquatic habitat is protected throughout construction. The construction barrier fencing will be commercial-quality, woven polypropylene, orange in color,

and 4 feet high (Tensor Polygrid or equivalent). The fencing will be tightly strung on posts with a maximum of 10-foot spacing.

Barrier and exclusion fences will be inspected daily by a qualified biological monitor during ground-disturbing activities and weekly after ground-disturbing activities until project construction is complete or until the fences are removed, as approved by the biological monitor and the resident engineer. The biological monitor will be responsible for ensuring that the contractor maintains the buffer area fences around giant garter snake habitat throughout construction. Biological inspection reports will be provided to the project lead and the Service.

Conservation Measure 8: Minimize Potential Impacts on Giant Garter Snake Habitat

SBFCA will implement the following measures to minimize potential impacts on giant garter snake habitat.

- Staging areas will be located at least 200 feet from suitable giant garter snake habitat.
- Any dewatered habitat will remain dry for at least 15 consecutive days after April 15 and prior to excavating or filling of the dewatered habitat.
- Vegetation clearing within 200 feet of the banks of suitable giant garter snake aquatic habitat will be limited to the minimum area necessary. Avoided giant garter snake habitat within or adjacent to the Action Area will be flagged and designated as an environmentally sensitive area, to be avoided by all construction personnel.
- The movement of heavy equipment within 200 feet of the banks of suitable giant garter snake aquatic habitat will be confined to designated haul routes to minimize habitat disturbance.

Conservation Measure 9: Prepare and Implement a Stormwater Pollution Prevention Plan

SBFCA will prepare a stormwater pollution prevention plan (SWPPP) that describes the BMPs that will be implemented to control accelerated erosion, sedimentation, and other pollutants during and after project construction. The SWPPP will be prepared prior to commencing earth-moving construction activities. This will also comply with the U.S. Environmental Protection Agency's National Pollutant Discharge Elimination System (NPDES) general construction activity stormwater permit.

The specific BMPs that will be incorporated into the erosion and sediment control plan and SWPPP will be site-specific and will be prepared by the construction contractor in accordance with the California Regional Water Quality Control Board Field Manual. However, the plan likely will include, but not be limited to, one or more of the following standard erosion and sediment control BMPs.

- **Timing of construction.** The construction contractor will conduct all construction activities during the typical construction season to avoid ground disturbance during the rainy season.
- **Staging of construction equipment and materials.** To the extent possible, equipment and materials will be staged in areas that have already been disturbed.

- **Minimize soil and vegetation disturbance.** The construction contractor will minimize ground disturbance and the disturbance/destruction of existing vegetation. This will be accomplished in part through the establishment of designated equipment staging areas, ingress and egress corridors, and equipment exclusion zones prior to the commencement of any grading operations.
- **Stabilize grading spoils.** Grading spoils generated during the construction will be temporarily stockpiled in staging areas. Silt fences, fiber rolls, or similar devices will be installed around the base of the temporary stockpiles to intercept runoff and sediment during storm events. If necessary, temporary stockpiles may be covered with an appropriate geotextile to increase protection from wind and water erosion.
- **Install sediment barriers.** The construction contractor may install silt fences, fiber rolls, or similar devices to prevent sediment-laden runoff from leaving the construction area. Natural/biodegradable erosion control measures (i.e., coir rolls, straw wattles or hay bales) will be used. Plastic monofilament netting (erosion control matting) will not be allowed because animals can become caught in this type of erosion control material.
- **Stormwater drain inlet protection.** The construction contractor may install silt fences, drop inlet sediment traps, sandbag barriers, and/or other similar devices.
- **Permanent site stabilization.** The construction contractor will install structural and vegetative methods to permanently stabilize all graded or otherwise disturbed areas once construction is complete. Structural methods may include the installation of biodegradable fiber rolls and erosion control blankets. Vegetative methods may involve the application of organic mulch and tackifier and/or the application of an erosion control seed mix. Implementation of a SWPPP will substantially minimize the potential for project-related erosion and associated adverse effects on water quality.

Conservation Measure 10: Prepare and Implement a Bentonite Slurry Spill Contingency Plan (Frac-Out Plan)

Before excavation begins, SBFCA will ensure the contractor will prepare and implement a bentonite slurry spill contingency plan (BSSCP) for any excavation activities that use pressurized fluids (other than water). The plan will be subject to approval by the Corps, Service, and SBFCA before excavation can begin. The BSSCP will include measures intended to minimize the potential for a frac-out (short for "fracture-out event") associated with excavation and tunneling activities; provide for the timely detection of frac-outs; and ensure an organized, timely, and "minimum-effect" response in the event of a frac-out and release of excavation fluid (i.e., bentonite). The BSSCP will require, at a minimum, the following measures.

- If a frac-out is identified, all work will stop, including the recycling of the bentonite fluid. In the event of a frac-out into water, the location and extent of the frac-out will be determined, and the frac-out will be monitored for 4 hours to determine whether the fluid congeals (bentonite will usually harden, effectively sealing the frac-out location).
- NMFS, the Service, CDFW, and the RWQCB will be notified immediately of any spills and will be consulted regarding clean-up procedures. A Brady barrel will be onsite and used if a frac-out occurs. Containment materials, such as straw bales, also will be onsite prior to and during all operations, and a vacuum truck will be on

retainer and available to be operational onsite within notice of 2 hours. The site supervisor will take any necessary follow-up response actions in coordination with agency representatives. The site supervisor will coordinate the mobilization of equipment stored at staging areas (e.g., vacuum trucks) as needed.

- If the frac-out has reached the surface, any material contaminated with bentonite will be removed by hand to a depth of 1-foot, contained, and properly disposed of, as required by law. The drilling contractor will be responsible for ensuring that the bentonite is either properly disposed of at an approved Class II disposal facility or properly recycled in an approved manner.
- If the bentonite fluid congeals, no other actions, such as disturbance of the streambed, will be taken that will potentially suspend sediments in the water column.
- The site supervisor has overall responsibility for implementing this BSSCP. The site supervisor will be notified immediately when a frac-out is detected. The site supervisor will be responsible for ensuring that the biological monitor is aware of the frac-out, coordinating personnel, response, cleanup, regulatory agency notification and coordination to ensure proper clean-up, disposal of recovered material, and timely reporting of the incident. The site supervisor will ensure all waste materials are properly containerized, labeled, and removed from the site to an approved Class II disposal facility by personnel experienced in the removal, transport, and disposal of drilling mud.
- The site supervisor will be familiar with the contents of this BSSCP and the conditions of approval under which the activity is permitted to take place. The site supervisor will have the authority to stop work and commit the resources (personnel and equipment) necessary to implement this plan. The site supervisor will ensure that a copy of this plan is available (onsite) and accessible to all construction personnel. The site supervisor will ensure that all workers are properly trained and familiar with the necessary procedures for response to a frac-out, prior to commencement of excavation operations.

Conservation Measure 11: Prepare and Implement a Spill Prevention, Control, and Counter-Measure Plan

A spill prevention, control, and counter-measure plan (SPCCP) is intended to prevent any discharge of oil into navigable water or adjoining shorelines. SBFCA or its contractor will develop and implement an SPCCP to minimize the potential for and effects from spills of hazardous, toxic, or petroleum substances during construction and operation activities. The SPCCP will be completed before any construction activities begin. Implementation of this measure will comply with State and Federal water quality regulations. The SPCCP will describe spill sources and spill pathways in addition to the actions that will be taken in the event of a spill (e.g., an oil spill from engine refueling will be immediately cleaned up with oil absorbents). The SPCCP will outline descriptions of containments facilities and practices such as doubled-walled tanks, containment berms, emergency shut-offs, drip pans, fueling procedures and spill response kits. It will also describe how and when employees are trained in proper handling procedure and spill prevention and response procedures.

SBFCA will review and approve the SPCCP before onset of construction activities and routinely inspect the construction area to verify that the measures specified in the SPCCP are properly implemented and maintained. SBFCA will notify its contractors immediately if there is a non-compliance issue and will require compliance.

The Federal reportable spill quantity for petroleum products, as defined in 40 CFR 110, is any oil spill that results in one or more of the following.

- Violates applicable water quality standards.
- Causes a film or sheen on or discoloration of the water surface or adjoining shoreline.
- Causes a sludge or emulsion to be deposited beneath the surface of the water or adjoining shorelines.

If a spill is reportable, the contractor's superintendent will notify SBFCA, and SBFCA will take action to contact the appropriate safety and cleanup crews to ensure that the SPCCP is followed. A written description of reportable releases must be submitted to the Central Valley RWQCB. This submittal must contain a description of the release, including the type of material and an estimate of the amount spilled, the date of the release, an explanation of why the spill occurred, and a description of the steps taken to prevent and control future releases. The releases will be documented on a spill report form.

Conservation Measure 12: Conduct Preconstruction Surveys and Monitoring for Giant Garter Snake

Prior to ground-disturbing activities within 200 feet of suitable habitat, a Service-approved biological monitor will conduct a preconstruction survey of suitable aquatic and upland habitat and inspect exclusion and orange barrier fencing to ensure they are both in good working order each morning. If any snakes are observed within the construction area at any other time during construction the Service-approved biological monitor will be contacted to survey the site for giant garter snakes. The biological monitor will have the authority to stop construction activities until appropriate corrective measures have been completed or it is determined that the snake will not be harmed. Giant garter snakes encountered during construction activities will be allowed to move away from construction activities on their own. If unable to move away on their own, trapped or injured giant garter snakes will be only be removed by a biologist with a federal 10(a)1(a) permit which allows them to handle the snake and will be placed in a location determined through discussions with the Service. The biological monitor will immediately report the finding of a snake to Service by phone and will provide a written account of the details of the incident within 24 hours.

Once all initial ground-disturbing activities are completed, the biological monitor will perform weekly checks of the site for the duration of construction in order to ensure that construction barrier fences and exclusion fences are in good order, trenches are being covered, project personnel are conducting checks beneath parked vehicles prior to their movement, and that all other required biological protection measures are being complied with. The biological monitor will document the results of monitoring on construction monitoring log sheets, which will be provided to the Service within 1 week of each monitoring visit.

Conservation Measure 13: Provide Escape Ramps or Cover Open Trenches at the End of Each Day

To avoid entrapment of giant garter snake, thereby preventing injury or mortality resulting from falling into trenches, all excavated areas more than 1 foot deep will be provided with one or more escape ramps constructed of earth fill or wooden planks at the end of each workday. If escape ramps cannot be provided, then holes or trenches will be covered with plywood or other hard material. The biological monitor or construction personnel designated by the contractor will be responsible for thoroughly inspecting trenches for the presence of giant garter snakes at the beginning of each workday. Capture and relocation of trapped or injured individuals can only be attempted by personnel or individuals with current Service recovery permits pursuant to section 10(a)1(A) of the Act.

Conservation Measure 14: Implement Additional Protective Measures during Work in Suitable Habitat during the Giant Garter Snake Dormant Period

SBFCA will implement additional protective measures during time periods when work must occur during the giant garter snake dormant period (October 2–April 30), when snakes are more vulnerable to injury and mortality. It is expected that these additional measures will be implemented during levee slope flattening within the Sutter-Butte Canal in Reaches 26–28 (scheduled for 2016) and pipe reconstruction adjoining the canal at two sites in the same reaches during February–March, and if construction activities extend to the period between October 2 and November 1. SBFCA will implement additional protective measures when conducting work in suitable giant garter snake habitat between October 2 and April 30.

- A full-time Service-approved biological monitor will be onsite for the duration of construction activities.
- All emergent vegetation within the Sutter-Butte Canal on the levee side, and vegetation within 200 feet of the canal will be cleared prior to the giant garter snake hibernation period (i.e., vegetation clearing must be completed by October 1 for following winter work).
- Exclusion fencing will be installed around the perimeter of the work area and across the Sutter-Butte Canal where construction activities associated with levee slope flattening and pipe reconstruction activities will occur. The fencing should enclose the work area to the maximum extent possible to prevent giant garter snakes from entering the work area. Fencing will be installed during the active period for giant garter snakes (May 1–October 1) to reduce the potential for injury and mortality during fence installation. The Service-approved biological monitor will work with the contractor to determine where fencing should be placed and will monitor fence installation. The exclusion fencing will consist of 3-foot-tall erosion fencing buried 4– 6 inches below ground level. The exclusion fencing will minimize opportunities for giant garter snake hibernation in the adjacent upland area (between canal and existing levee).
- Portions of the Sutter-Butte Canal that are temporarily disturbed during construction will be revegetated with emergent vegetation and adjacent disturbed upland habitat will be revegetated with native grasses and forbs after construction is complete.

Conservation Measure 15: Restore Temporarily Disturbed Aquatic and Upland Habitat to Pre-Action Conditions

Upon completion of the proposed project, SBFCA will restore 42.52 acres of suitable aquatic habitat and 118.80 acres of suitable upland habitat for the giant garter snake to pre-project conditions. Restoration of aquatic vegetation and annual grassland will be detailed in a mitigation and monitoring plan that will be reviewed and approved by the Corps and Service prior to the start of construction. Habitat will be restored within one season (defined as May 1–October 1) and providing vegetative cover within 1 year of construction beginning in that area.

Conservation Measure 16: Compensate for Permanent Loss of Aquatic Habitat for Giant Garter Snake

SBFCA will compensate for the permanent loss of 0.004 acre of suitable aquatic habitat for giant garter snake by purchasing preservation credits equal to 0.012 acre of giant garter snake habitat at Westervelt Ecological Services' Sutter Basin Conservation Bank in Sutter County. This bank has available giant garter snake credits and is approved by both the Service and CDFW.

The 0.012 acre of habitat at the conservation bank will be protected in perpetuity for giant garter snake. Prior to the start of construction (excluding Reach 13, as there is no giant garter snake habitat in this reach), SBFCA will provide funding to Westervelt Ecological Services for preservation credits equivalent to 0.012 acre of giant garter snake habitat at the Sutter Basin Conservation Bank. The transaction will take place through a purchase and sale agreement, and funds must be transferred within 30 days, and before any construction activities are initiated. SBFCA will provide the Service and CDFW with copies of the credit sale agreement and fund transfer.

Analytical Framework for the Jeopardy Analysis

In accordance with policy and regulation, the jeopardy analysis in this biological opinion relies on four components: (1) the *Status of the Species*, which evaluates the beetle's and snake's range-wide condition, the factors responsible for that condition, and their survival and recovery needs; (2) the *Environmental Baseline*, which evaluates the condition of the beetle and the snake in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the beetle and snake; (3) the *Effects of the Action*, which determines the direct and indirect impacts of the proposed federal action and the effects of any interrelated or interdependent activities on the beetle and snake; and (4) the *Cumulative Effects*, which evaluates the effects of future, non-Federal activities in the action area on the beetle and snake.

In accordance with policy and regulation, the jeopardy determination is made by evaluating the effects of the proposed Federal action in the context of the beetle's and snake's current status, taking into account any cumulative effects, to determine if implementation of the proposed

action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of the beetle and snake.

The jeopardy analysis in this biological opinion places an emphasis on consideration of the range-wide survival and recovery needs of the beetle and snake and the role of the action area in the survival and recovery of the beetle and snake as the context for evaluating the significance of the effects of the proposed Federal action, taken together with cumulative effects, for purposes of making the jeopardy determination.

Status of the Species

Valley Elderberry Longhorn Beetle

Please refer to the *Valley Elderberry Longhorn Beetle (Desmocerus californicus dimorphus) 5-year Review: Summary and Evaluation* (Service 2006) for the current status of the species.

Giant Garter Snake

Please refer to the *Giant Garter Snake (Thamnophis gigas) 5-year Review: Summary and Evaluation* (Service 2012) for the current status of the species.

Environmental Baseline

Valley Elderberry Longhorn Beetle

The closest beetle occurrence in the CNDDB (2013) is about 0.5 mile from the proposed project. Suitable habitat for the beetle (in the form of elderberry shrubs) exists in numerous places along the 41 miles of proposed levee repair. A total of 267 elderberry shrubs were mapped within the action area. Many others exist at various locations between the levee and the river. Of these SBFCA is proposing to avoid 175 elderberry shrubs and transplant 91 elderberry shrubs. Because the action area is within the range of the species, there are known occurrences from the vicinity of the action area, and suitable habitat is present, the Service concludes that it is reasonably likely for the beetle to occupy the action area.

Giant Garter Snake

The *Draft Recovery Plan for the Giant Garter Snake* subdivides the range of the species into four recovery units (Service 1999b). The action area for the proposed project is located within the Sacramento Valley Recovery Unit. There are 20 records of the snake within 5 miles of the action area. The closest occurrence documented in the CNDDB is 2 miles from the action area. Snakes have the potential to occur within the action area because suitable aquatic and upland habitat is present as it is hydrologically connected to areas that support rice agriculture and areas where the snake has previously been detected. The action area is a long corridor that occasionally has irrigation ditches, which run parallel to the levee for limited stretches. The main threat to the snake in the action area is loss of habitat or connectivity due to channel and levee maintenance.

Effects of the Proposed Action

Valley Elderberry Longhorn Beetle

Ninety-one elderberry shrubs will be removed and transplanted. The 91 affected shrubs have 361 stems between 1 and 3 inches, 92 stems between 3 and 5 inches and 100 stems greater than 5 inches at ground level.

Loss of an elderberry shrub or even a stem can affect the beetle breeding and feeding because adult beetles rely solely on elderberry foliage and flowers for food and must lay their eggs on elderberry stems to successfully reproduce.

Transplantation of elderberry shrubs that are or could be used by beetle larvae is expected to adversely affect the beetle. Beetle larvae will be killed or the beetle's life cycle will be interrupted during or after the transplanting process. For example:

1. Transplanted elderberry shrubs may experience stress or become unhealthy due to changes in soil, hydrology, microclimate, or associated vegetation. This may reduce their quality as habitat for the valley elderberry longhorn beetle, or impair their production of habitat-quality stems in the future.

2. Elderberry shrubs may die as a result of transplantation.

3. Branches containing larvae may be cut, broken, or crushed as a result of the transplantation process.

SBFCA has proposed to transplant one shrub outside of the elderberry shrub's dormant season (November 1 to February 15). To offset the increased risk of the transplantation not being successful SBFCA has proposed to plant 2.5 times the number of elderberry seedlings at the Star Bend Conservation Area.

Temporal loss of habitat will occur. Although conservation measures for effects on the beetle will involve creation or restoration of habitat, it generally takes 5 or more years for elderberry plants to become large enough to support beetles, and it may take 25 years or longer for riparian habitats to reach their full value. Temporal loss of habitat may cause fragmentation of habitat and isolation of subpopulations.

Permanent and temporary habitat loss adversely affects the beetles breeding and foraging requirements. Habitat creation and transplantation of the shrubs will minimize these effects. Success of a restoration site has been linked to presence of transplanted elderberry shrubs that have served to colonize a newly created riparian habitat. Transplants that survive also provide diversity within the conservation area as they are older, larger shrubs within the plantings of young small elderberry seedlings. The Star Bend Conservation Area will be protected with a conservation easement and managed in perpetuity for riparian habitat including valley elderberry longhorn beetle habitat, through development of the *Feather River West Levee Project Mitigation and Monitoring Plan.*

Giant garter snake

Aquatic habitat for the snake near the levee construction varies along the 41 miles of the proposed project. Small areas of aquatic habitat are present in Contract A and C and they are hydrologically connected to areas that support habitat for the snake (rice). Contract D has the largest amount of snake aquatic habitat as the Sutter Butte Canal parallels the levee for longer lengths. Canal filling due to cutoff wall construction will permanently fill 0.004 acre of snake aquatic habitat. Upland habitat around this aquatic habitat will be temporarily disturbed but returned to pre-project condition within one year. Temporary effects will result from temporary fill of aquatic habitat for construction access, reshaping the slope of the Sutter Butte Canal and adjacent levee, and degradation and reconstruction of the levee. These activities will temporarily affect 6.81 acres of aquatic habitat. Levee degradation and reconstruction will temporarily affect 112.47 acres of upland habitat. All temporarily affected areas will be restored to pre-project conditions within the same year the disturbance will occur. This will minimize effects to giant garter snakes because the amount of time the habitat will be unavailable to the snake will be minimized. Permanently affected habitat, such as the canals that will be made smaller will be offset by purchasing 0.012 acre of giant garter snake habitat at Westervelt Ecological Services' Sutter Basin Conservation Bank in Sutter County. None of the borrow sites in the project description have upland or aquatic giant garter snake habitat.

The majority of the construction work will occur during the giant garter snake active season (May 1 to October 1). Increased construction activity in areas where snakes are known to occur could expose snakes to increased risks of injury and mortality from predation, exposure, vehicular traffic, and construction equipment. Because snakes are more mobile during the active season, these effects should be lessened. There are a few activities which SBFCA could not construct during the active season. Because of cooler temperatures in the inactive season (October 1 to May 1), the snake is not as mobile and is most frequently found within burrows. Ground disturbing activities during this timeframe will increase the likelihood of snake mortality when the burrows are disturbed with heavy equipment. SBFCA has proposed to disturb (clear and grub) the out of season work area and place exclusion fencing around the work area during the active season which will create an area that will not support overwintering snakes (lack of burrows). This will minimize the chance of injuring or killing an overwintering snake during out of season construction. This will only occur on one side of the canal, leaving the other side of the canal available as overwintering habitat for the snake.

Temporary effects within the action area will affect both aquatic and upland snake habitat. In some locations degradation of the levee could cause soil to fall into the aquatic habitat or fuel or oil leaks could also adversely affect the habitat and the snake. Placement of sediment fencing and implementing sediment and contaminant BMPs will lessen this effect. Levee degradation will temporarily make upland habitat unavailable to the snake during the active season. Snakes use upland habitat for thermoregulation both as a place to bask and as a place to escape extreme heat (burrows) and cover for shedding and giving birth to young. While snakes are more active during the summer months and more likely to move away from construction, some snakes may choose to remain where they are and therefore will be subject to mortality when construction activities are occurring. In addition to direct mortality, the upland habitat will be temporarily unavailable to the snake during construction. Even once construction is completed it will take a

year or two for the upland habitat to become completely functional for the snake, with burrows or crevices available for them to use. This is likely to result in disturbance, displacement, injury, and/or mortality of snakes. To lessen these effects SBFCA is implementing the conservation measures described above as well as affecting only one side of the canal. This will leave the other side of the canal intact and available to the snake for use, minimizing displacement of snakes. Additionally, because of the staging of construction not all of the upland habitat will be unavailable for use at one time. It will be staged as construction progresses through the various contracts.

Cumulative Effects

Cumulative effects include the effects of future State, Tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed project are not considered in this section, because they require separate consultation pursuant to section 7 of the Act. Any future land use conversions and routine agricultural practices are not subject to Federal authorization or funding and may alter the habitat or result in take of listed valley elderberry longhorn beetle or giant garter snake and are, therefore, cumulative to the proposed project.

Conclusion

After reviewing the current status of the valley elderberry longhorn beetle and giant garter snake, the environmental baselines for these species, the effects of the proposed project, and the cumulative effects on this species, it is the Service's biological opinion that the proposed FRWLP, as described herein, is not likely to jeopardize the continued existence of these species. Although critical habitat has been designated for the beetle, the proposed action will not affect critical habitat.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harass is defined by the Service as an intentional or negligent act or omission which creates the likelihood of injury to a listed species by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding or sheltering. Harm is defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by impairing behavioral patterns including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act, provided that such taking is in compliance with this Incidental Take Statement.

The measures described below are nondiscretionary for listed species of this biological opinion and must be implemented by the Corps and SBFCA in order for the exemption in section 7(o)(2)

to apply. The Corps has a continuing duty to regulate the activity that is covered by this incidental take statement. If the Federal agency (1) fails to adhere to the terms and conditions of the incidental take statement, and/or (2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

Amount or Extent of Take

Valley Elderberry Longhorn Beetle

The Service expects that incidental take of the valley elderberry longhorn beetle will be difficult to detect or quantify. The cryptic nature of this species and their relatively small body size make the finding of an injured or dead specimen unlikely. The species occurs in habitats that make them difficult to detect. Due to the difficulty in quantifying the number of beetles that will be taken as a result of the proposed action, the Service is quantifying take incidental to the project as the number of elderberry stems one inch or greater in diameter at ground level (beetle habitat) that will become unsuitable for beetles due to direct or indirect effects as a result of levee construction. Therefore, the Service estimates that all beetles inhabiting 91 elderberry plants containing stems 1 inch or greater at ground level (361 stems between 1-3 inches, 92 stems between 3 and 5 inches and 100 stems $\geq$5 inches; see Table 1 in the text) will be taken as a result of the proposed action.

Giant Garter Snake

The Service anticipates that incidental take of the snake will be difficult to detect or quantify for the following reasons: the snake is cryptically colored, secretive, and known to be sensitive to human activities. Snakes may avoid detection by retreating to burrows, soil crevices, vegetation, or other cover. Individual snakes are difficult to detect unless they are observed, undisturbed, at a distance. Most close-range observations represent chance encounters that are difficult to predict. It is not possible to make an accurate estimate of the number of snakes that will be harassed, harmed or killed during construction activities (staging areas, work on canal banks, levee degradation and reconstruction, soil borrow areas, and vehicle traffic to and from borrow areas). In instances when take is difficult to detect, the Service may use the quantification of acreage as a surrogate for the individuals that will be taken. Therefore, the Service anticipates take incidental to this project as the 0.004 acre of suitable habitat that will be permanently lost and the 119.28 acres (6.81 acres aquatic and 112.47 acres upland) of suitable snake habitat that will be temporarily lost. Upon implementation of the Reasonable and Prudent Measure, Terms and Conditions, and the Proposed Conservation Measures considered herein, incidental take within this acreage for the proposed project, will be exempt from the prohibitions described under Section 9 of the Act.

Effect of the Take

The Service has determined that this level of anticipated take is not likely to result in jeopardy to the beetle or snake.

Reasonable and Prudent Measures

The Service has determined that the following reasonable and prudent measure is necessary and appropriate to minimize the adverse effects of the Feather River West Levee Project to the beetle and snake and their habitat in the action area.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the Corps and SBFCA must ensure compliance with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are nondiscretionary.

The following Terms and Conditions implement the Reasonable and Prudent Measure:

1. All the conservation measures as described in the project description, and as restated here in this biological opinion, must be fully implemented and adhered to.

2. The Corps, SBFCA, and PG&E shall include full implementation and adherence to the conservation measures as outlined in the biological opinion as a condition of any permit or contract issued for the project.

3. In order to monitor whether the amount or extent of take anticipated from implementation of the proposed project is approached or exceeded, the Corps and SBFCA shall adhere to the following reporting requirement. Should this anticipated amount or extent of incidental take be exceeded, the Corps must immediately reinitiate formal consultation as per 50 CFR 402.16.

    a. For those components of the proposed project that will result in habitat degradation or modification whereby incidental take in the form of harm or mortality is anticipated, the Corps and SBFCA will provide weekly updates to the Service with a precise accounting of the total acreage of habitat effected or number of elderberry shrubs and size of stems at ground level transplanted. Updates shall also include any information about changes in the Project Description and not analyzed in this biological opinion.

4. SBFCA shall provide a photo documentation report showing pre- and post-project area conditions for giant garter snake.

Salvage and Disposition of Individuals

The Sacramento Fish and Wildlife Office will be notified within 1 day of the finding of any dead or injured snake or beetle to determine the appropriate measures for salvage and disposition. The Service contact person is the Habitat Conservation Division Chief. In addition, the Recovery Division Chief shall also be notified within 1 day of the procedures implemented for salvage and disposition of the snake or beetle. The applicant must report to the Service immediately any information about take or suspected take of listed species not authorized in this biological

opinion. Notification must include the date, time, and location of the incident or of the finding of a dead or injured listed species. The Habitat Conservation and Recovery Divisions Chiefs can be contacted at (916) 414-6600. The California Department of Fish and Wildlife should also be contacted at (916)358-2900.

CONSERVATION RECOMMENDATIONS

Conservation recommendations are suggestions of the Service regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of new information. These measures may serve to further minimize or avoid the adverse effects of a proposed action on listed, proposed, or candidate species, or on designated critical habitat. They may also serve as suggestions on how action agencies can assist species conservation in furtherance of their responsibilities under section 7(a)(1) of the Act, or recommend studies improving an understanding of a species' biology or ecology. Wherever possible, conservation recommendations should be tied to tasks identified in recovery plans. The Service is providing you with the following conservation recommendations:

1. The Corps and SBFCA should assist in the implementation of the draft, and when published, the final Recovery Plan for the snake.

2. The Corps and SBFCA should provide funding to researchers studying topics identified by the Service in the draft, and when published, the final Recovery Plan for the snake.

3. The Corps should use environmental restoration authorities to acquire and restore beetle and snake habitat.

To be kept informed of actions minimizing or avoiding adverse effects or benefiting listed and proposed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION - CLOSING STATEMENT

This concludes formal consultation with the Corps on the Feather River West Levee Project. As provided in 50 CFR 402.16, re-initiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the proposed action may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in this opinion; or (4) a new species or critical habitat is designated that may be affected by the proposed action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending re-initiation.

If you have any questions regarding this Feather River West Levee Project biological opinion, please contact Jennifer Hobbs, at (916) 414-6541 or Doug Weinrich, Deputy Assistant Field Supervisor, at (916) 414-6563.

Sincerely,

Roberta Gerson

for Jan C. Knight
Acting Field Supervisor

cc:
Jeff Koschak, Corps, Sacramento, CA
Jenny Marr, CDFW, Chico, CA
Jennifer Haire, ICF, Sacramento, CA

Literature Cited

California Natural Diversity Database (CNDDB). 2013. Natural Heritage Division, California Department of Fish and Game. Sacramento, California.

U.S. Fish and Wildlife Service (Service). 1999a. Conservation Guidelines for the Valley Elderberry Longhorn Beetle. U.S. Fish and Wildlife Service, Sacramento Fish and Wildlife Office, Sacramento, California.

_____. 1999b. Draft Recovery Plan for the Giant Garter Snake (*Thamnophis gigas*). U.S. Fish and Wildlife Service, Portland, Oregon. x + 192 pp.

_____. 2006. Valley Elderberry Longhorn Beetle (Desmocerus californicus dimorphus) 5-Year Review: Summary and Evaluation. U.S. Fish and Wildlife Service, Sacramento Fish and Wildlife Office, Sacramento, California.

_____. 2012. Giant Garter Snake *(Thamnophis gigas)* 5-Year Review: Summary and Evaluation. U.S. Fish and Wildlife Service, Sacramento Fish and Wildlife Office, Sacramento, California. 46 pp.

U.S. Fish & Wildlife Service
Sacramento Fish & Wildlife Office

Federal Endangered and Threatened Species that Occur in or may be Affected by Projects in the Counties and/or U.S.G.S. 7 1/2 Minute Quads you requested

Document Number: 130213052954

Database Last Updated: September 18, 2011

No quad species lists requested.

County Lists

Sutter County

Listed Species

Invertebrates

Branchinecta conservatio
Conservancy fairy shrimp (E)

Branchinecta lynchi
Critical habitat, vernal pool fairy shrimp (X)
vernal pool fairy shrimp (T)

Desmocerus californicus dimorphus
valley elderberry longhorn beetle (T)

Lepidurus packardi
Critical habitat, vernal pool tadpole shrimp (X)
vernal pool tadpole shrimp (E)

Fish

Acipenser medirostris
green sturgeon (T) (NMFS)

Hypomesus transpacificus
delta smelt (T)

Oncorhynchus mykiss
Central Valley steelhead (T) (NMFS)
Critical habitat, Central Valley steelhead (X) (NMFS)

Oncorhynchus tshawytscha
Central Valley spring-run chinook salmon (T) (NMFS)
Critical Habitat, Central Valley spring-run chinook (X) (NMFS)
Critical habitat, winter-run chinook salmon (X) (NMFS)
winter-run chinook salmon, Sacramento River (E) (NMFS)

Amphibians

Ambystoma californiense
California tiger salamander, central population (T)

Rana draytonii
California red-legged frog (T)

Reptiles

Thamnophis gigas
giant garter snake (T)

Birds

Charadrius alexandrinus nivosus
western snowy plover (T)

Plants

Cordylanthus palmatus
palmate-bracted bird's-beak (E)

Pseudobahia bahiifolia
Hartweg's golden sunburst (E)

Candidate Species

Birds

Coccyzus americanus occidentalis
Western yellow-billed cuckoo (C)

Key:

(E) *Endangered* - Listed as being in danger of extinction.

(T) *Threatened* - Listed as likely to become endangered within the foreseeable future.

(P) *Proposed* - Officially proposed in the Federal Register for listing as endangered or threatened.

(NMFS) Species under the Jurisdiction of the National Oceanic & Atmospheric Administration Fisheries Service. Consult with them directly about these species.

Critical Habitat - Area essential to the conservation of a species.

(PX) *Proposed Critical Habitat* - The species is already listed. Critical habitat is being proposed for it.

(C) *Candidate* - Candidate to become a proposed species.

(V) Vacated by a court order. Not currently in effect. Being reviewed by the Service.

(X) *Critical Habitat* designated for this species

Important Information About Your Species List

How We Make Species Lists

We store information about endangered and threatened species lists by U.S. Geological

Survey 7½ minute quads. The United States is divided into these quads, which are about the size of San Francisco.

The animals on your species list are ones that occur within, **or may be affected by** projects within, the quads covered by the list.

- Fish and other aquatic species appear on your list if they are in the same watershed as your quad or if water use in your quad might affect them.
- Amphibians will be on the list for a quad or county if pesticides applied in that area may be carried to their habitat by air currents.
- Birds are shown regardless of whether they are resident or migratory. Relevant birds on the county list should be considered regardless of whether they appear on a quad list.

Plants

Any plants on your list are ones that have actually been observed in the area covered by the list. Plants may exist in an area without ever having been detected there. You can find out what's in the surrounding quads through the California Native Plant Society's online Inventory of Rare and Endangered Plants.

Surveying

Some of the species on your list may not be affected by your project. A trained biologist and/or botanist, familiar with the habitat requirements of the species on your list, should determine whether they or habitats suitable for them may be affected by your project. We recommend that your surveys include any proposed and candidate species on your list. See our Protocol and Recovery Permits pages.

For plant surveys, we recommend using the Guidelines for Conducting and Reporting Botanical Inventories. The results of your surveys should be published in any environmental documents prepared for your project.

Your Responsibilities Under the Endangered Species Act

All animals identified as listed above are fully protected under the Endangered Species Act of 1973, as amended. Section 9 of the Act and its implementing regulations prohibit the take of a federally listed wildlife species. Take is defined by the Act as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect" any such animal.

> Take may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or shelter (50 CFR §17.3).

Take incidental to an otherwise lawful activity may be authorized by one of two procedures:

- If a Federal agency is involved with the permitting, funding, or carrying out of a project that may result in take, then that agency must engage in a formal consultation with the Service.

  During formal consultation, the Federal agency, the applicant and the Service work together to avoid or minimize the impact on listed species and their habitat. Such consultation would result in a biological opinion by the Service addressing the anticipated effect of the project on listed and proposed species. The opinion may authorize a limited level of incidental take.

- If no Federal agency is involved with the project, and federally listed species may be taken as part of the project, then you, the applicant, should apply for an incidental take permit. The Service may issue such a permit if you submit a satisfactory conservation plan for the species that would be affected by your project.

Should your survey determine that federally listed or proposed species occur in the area and are likely to be affected by the project, we recommend that you work with this office and the California Department of Fish and Game to develop a plan that minimizes the project's direct and indirect impacts to listed species and compensates for project-related loss of habitat. You should include the plan in any environmental documents you file.

Critical Habitat

When a species is listed as endangered or threatened, areas of habitat considered essential to its conservation may be designated as critical habitat. These areas may require special management considerations or protection. They provide needed space for growth and normal behavior; food, water, air, light, other nutritional or physiological requirements; cover or shelter; and sites for breeding, reproduction, rearing of offspring, germination or seed dispersal.

Although critical habitat may be designated on private or State lands, activities on these lands are not restricted unless there is Federal involvement in the activities or direct harm to listed wildlife.

If any species has proposed or designated critical habitat within a quad, there will be a separate line for this on the species list. Boundary descriptions of the critical habitat may be found in the Federal Register. The information is also reprinted in the Code of Federal Regulations (50 CFR 17.95). See our Map Room page.

Candidate Species

We recommend that you address impacts to candidate species. We put plants and animals on our candidate list when we have enough scientific information to eventually propose them for listing as threatened or endangered. By considering these species early in your planning process you may be able to avoid the problems that could develop if one of these candidates was listed before the end of your project.

Species of Concern

The Sacramento Fish & Wildlife Office no longer maintains a list of species of concern. However, various other agencies and organizations maintain lists of at-risk species. These lists provide essential information for land management planning and conservation efforts. More info

Wetlands

If your project will impact wetlands, riparian habitat, or other jurisdictional waters as defined by section 404 of the Clean Water Act and/or section 10 of the Rivers and Harbors Act, you will need to obtain a permit from the U.S. Army Corps of Engineers. Impacts to wetland habitats require site specific mitigation and monitoring. For questions regarding wetlands, please contact Mark Littlefield of this office at (916) 414-6520.

Updates

Our database is constantly updated as species are proposed, listed and delisted. If you address proposed and candidate species in your planning, this should not be a problem. However, we recommend that you get an updated list every 90 days. That would be May 14, 2013.

Sutter Basin Pilot Feasibility Study
Draft Mitigation and Monitoring Plan

PREPARED FOR:

U.S. Army Corps of Engineers
1325 J Street
Sacramento, CA 95814
Contact: Matt Davis
916.557.6708

PREPARED BY:

ICF International
630 K Street, Suite 400
Sacramento, CA 95814
Contact: Carl Jensen
916.737.3000

May 2013

ICF International. 2013. Sutter Basin Pilot Feasibility Study Draft Mitigation and Monitoring Plan. (ICF 00165.12.) Sacramento, CA. Prepared for U.S. Army Corps of Engineers, Sacramento, CA.

Contents

List of Tables

List of Figures

Figures **The figures are found at the end of the document**

List of Abbreviated Terms

AEP	annual exceedance probability
BSSCP	bentonite slurry spill contingency plan
CAPP	Conceptual Area Protection Plans
CDFW	California Department of Fish and Wildlife
CH	fat clay
CL	lean clay
CLSM	controlled low strength material
CVFPB	Central Valley Flood Protection Board
CVFPP	Central Valley Flood Protection Plan
CWA	Clean Water Act
DBH	diameter at breast height
DSM	deep soil mixing
DWR	Department of Water Resources
EIR	environmental impact report
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
ESAs	Environmentally Sensitive Areas
feasibility study	Sutter Basin Pilot Feasibility Study
FR	Federal Register
FRWLP	Feather River West Levee Project
GGS	giant garter snake
GPS	global positioning system
ICF	ICF International
LAE	Land Acquisition Evaluations
LD1	Levee District 1
LL	Liquid Limit
ML	silt
MMP	mitigation and monitoring proposal
MOU	Memorandum of Understanding
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
OHWM	ordinary high water mark
PI	Plasticity Index

RWQCB	Regional Water Quality Control Board
SB	Senate Bill
SBFCA	Sutter Butte Flood Control Agency
SC	clayey sand
SM	silty sand
SPCCP	spill prevention, control, and counter-measure plan
SR	State Route
SWPPP	stormwater pollution prevention plan
TSP	Tentative Selected Plan
UPRR	Union Pacific Railroad
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
VELB	valley elderberry longhorn beetle

Chapter 1
Responsible Parties

This document describes the mitigation and monitoring plan (MMP) for effects associated with implementation of the Sutter Basin Pilot Feasibility Study (feasibility study). Implementation of flood risk reduction projects outlined in the feasibility study will create permanent and unavoidable impacts to habitats and species that require mitigation. This document identifies responsible parties for the mitigation project, describes the location and nature of the project, and discusses the types, functions, and values of United States. Army Corps of Engineers (USACE) jurisdictional wetlands and other waters of the United States.

In addition to the mitigation plan for impacted Section 404 jurisdictional features, this MMP also includes impacts and mitigation for riparian and non-riparian native trees, and special status species habitat for valley elderberry longhorn beetle (VELB) and permanent impacts to giant garter snake (GGS), for which compensatory mitigation is required.

Compensatory mitigation for riparian forest, non-riparian native trees and VELB will occur at the Star Bend Conservation Area and the TRLIA Feather River Floodway Corridor Restoration Site, both located on the Feather River. Mitigation for GGS and Section 404 jurisdictional features will occur at off-site private banking lands.

1.1 Mitigation Planning Guidance

As part of the feasibility study, a MMP was developed based on the following USACE and State guidance and the recommendations of the USFWS and other resource agencies.

1.1.1 USACE Mitigation Planning Guidance

In accordance with Council on Environmental Quality (CEQ) Regulations for Implementing NEPA (40 CFR 1500-1508), and with Appendix C, paragraph C-3 of ER 1105-2-100, "Policy and Planning Guidance for Conducting Civil Works Planning Studies (Planning Guidance Notebook)", the planning of USACE projects must ensure that project-related adverse environmental impacts (i.e., impacts to fish and wildlife resources) have been avoided or minimized to the extent practicable, and that remaining unavoidable significant adverse impacts are compensated to the extent justified. Corps regulations stipulate that the Recommended Plan must contain sufficient mitigation measures to ensure that the plan selected will have no more than negligible net adverse impacts on fish and wildlife resources. Furthermore, a Cost Effectiveness Incremental Cost Analysis must be performed to identify the most cost-effective mitigation plan.

Under WRDA 2007, Section 2036(a) , the Corps must fully develop a mitigation plan that includes the following: 1) monitoring until successful, 2) criteria for determining ecological success, 3) a description of available lands for mitigation and the basis for the determination of availability, 4) the development of contingency plans (i.e., adaptive management), 5) identification of the entity responsible for monitoring; and 6) establishing a consultation process with appropriate Federal and State agencies in determining the success of mitigation.

1.1.2 California Department of Fish and Wildlife Compliance

This document follows the format and contains the elements described in USACE report *Mitigation and Monitoring Proposal Guidelines, December 30, 2004* (USACE 2004). Because this report also includes mitigation for non-Section 404 jurisdictional features and will utilize land at the Star Bend Conservation Area, the document also complies with the California Department of Fish and Wildlife's (CDFW) own guidelines outlined in *Policy for Mitigation on Publicly Owned, Department Owned, and Conserved Lands* (CDFW 2012). The policy statement contained within the CDFW's report states:

> *Mitigation for impacts to fish and wildlife resources may occur on publicly owned, Department owned, and conserved lands if it has been determined by the Department that: 1) the mitigation is consistent with requirements of the law under which the mitigation is being sought; 2) its relative value as mitigation is equal to or greater than it would be if the same mitigation were situated on non-public or non-conserved lands; 3) it results in a clear and quantifiable improvement or positive change above that currently present or reasonably expected to exist under current conditions on the site; 4) the future uses of the land, including encumbrances or easements, will not preclude or diminish the mitigation; 5) the mitigation will not preclude, diminish or interfere with the funding or purpose of acquisition, encumbrances, or management plan for the property; and 6) it will not result in a net loss of existing conservation values.*

CDFW Guidelines for Implementing Mitigation on Department Owned or Conserved Lands

The following guidelines are addressed throughout the MMP below. Items 1 through 4 have been fully addressed in this MMP. Item 5 is addressed in the project's incremental cost analysis. The Memorandum of Understanding described in item 6 below is still a work in progress and will be finalized before the MMP is complete.

1. Mitigation is consistent with the current and future uses of the land including any encumbrances, easements or public use values.
    a. To find information on encumbrances, easements or public use values the following documents should be checked:
        i. Management plan for the property
        ii. Any Conceptual Area Protection Plans (CAPP) or Land Acquisition Evaluations (LAE) written for the property
        iii. Easements can be found on the California Natural Resources Agency website and at the County Recorders office. The Lands Program should also be checked.
        iv. Title search – this should be performed by the entity proposing the mitigation
        v. Site visits should be performed
2. Mitigation is consistent with the purpose for which the land was acquired and the funding source used for acquisition.

3. Mitigation will not preclude, diminish or interfere with encumbrances, or the management plan for the property.
4. Mitigation maintains and or enhances the current ecological and public use values of the land.
    a. Entity proposing the mitigation needs to provide documentation of how placing the mitigation on the land is going to maintain or enhance the ecological and public use values of the land.
5. The full cost of the mitigation is accounted for (this includes but is not limited to all capital improvements, restoration, enhancement, monitoring, long term management and maintenance and reimbursement for any Department staff time including enforcement, on all lands).
6. A Memorandum of Understanding (MOU) is in place prior to the project sponsors undertaking the project. The MOU will be developed in cooperation with the land manager, reviewed for statewide consistency by the Department's Lands Program in the Wildlife Branch and signed by the District Assistant Chief and the Department Regional Manager, the land management agency or non-profit (if other than the Department), and the project sponsor. The MOU will define the mitigation purpose, permit requirements, agreement term, scope of work, schedule, management and/or maintenance requirements, monitoring, and responsibilities of the parties to the agreement.

1.2 Lead Agency

USACE is the lead agency and implementing agency for the feasibility study. USACE is preparing the Environmental Impact Statement (EIS) for the purposes of compliance with the National Environmental Policy Act (NEPA). USACE is also completing Section 7 Endangered Species Act consultation with the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) for the project. USACE is the lead Federal agency with financial responsibility for implementing the MMP and satisfying the success criteria.

The project proponent is:

U.S. Army Corps of Engineers
1325 J Street
Sacramento, CA 95814
Contact: Matt Davis
Phone: (916) 557-6708

This MMP was prepared by:

ICF International
630 K Street, Suite 400
Sacramento, CA 95814
Contact: Carl Jensen
Phone: (916) 231-7668

Chapter 2
Project Requiring Mitigation

2.1 Project Location

North to south, the feasibility study area is located in the 41-mile corridor along the west levee of the Feather River that begins at the Thermalito Afterbay and ends approximately 4 miles north of the Sutter Bypass (Figure 1). The project area consists of the project construction footprint plus a 100-foot-wide buffer zone. The feasibility project construction area was defined as the area in which levee improvements—such as seepage berms, stability berms, relief wells, and slurry cutoff walls—are likely to be constructed. All direct and indirect effects would occur within the project area.

The feasibility study area corridor is divided into 41 relatively reaches for ease of describing existing conditions, project components, land cover types, and potential effects (note that this number is coincidental and one reach does not correspond to a length of 1 mile). The levee stations, lengths, landmarks, and dominant land uses for the reaches are listed in Table 2-1. Table 2-1

Table 2-1. Summary of Reaches in the Feasibility Study Area

Reach	Beginning Station	Ending Station	Length (feet)	Landmark(s)	Dominant Land Uses
1	189+00	202+50	2,250	Laurel Avenue	
2	202+50	218+66	1,616		Ruderal grassland; open space
3	218+66	300+66	8,200	Cypress Avenue	Ruderal grassland; open space
4	300+66	410+67	11,001	Central Street; Wilkie Avenue	Orchard; ruderal grassland; riparian forest
5	410+67	478+68	6,801	Wilkie Avenue	Orchard
6	478+68	510+37	3,169	Star Bend	Orchard
7	510+37	596+00	8,563	Abbott Lake	Ruderal grassland; open space
8	596+00	654+75	5,875		Ruderal grassland; open space
9	654+75	706+50	5,175	Boyd's Boat Launch; Nursery	Ruderal grassland; open space
10	706+50	774+00	6,750	Barry Road	Ruderal grassland; open space
11	774+00	830+00	5,600		Ruderal grassland; open space
12	830+00	845+00	1,500	Shanghai Bend	Ruderal grassland; open space
13	845+00	927+00	8,200		Ruderal grassland; open space
14	927+00	954+40	2,740	Airport	Ruderal grassland; open space
15	954+40	968+50	1,410	Airport	Developed; ruderal grassland
16	968+50	1080+00	11,150	Garden Highway, 2nd Street; Twin Cities Memorial Bridge; Colusa Avenue	Developed; ruderal grassland
17	1080+00	1130+86	5,086	Live Oak Boulevard; Union Pacific Railroad	Developed; ruderal grassland
18	1130+86	1213+85	8,299	Live Oak Boulevard; Union Pacific Railroad; Rednall Road	Orchard
19	1213+85	1297+83	8,398		Orchard
20	1297+83	1374+33	7,650		Orchard; ruderal grassland
21	1374+33	1433+83	5,950		Ruderal grassland
22	1433+83	1503+83	7,000		Riparian forest; ruderal grassland
23	1503+83	1609+37	10,554		Orchard
24	1609+37	1623+86	1,449		Riparian forest; ruderal grassland
25	1623+86	1674+37	5,051		Orchard; ruderal grassland
26	1674+37	1707+11	3,274		Orchard
27	1707+11	1721+60	1,449		Ruderal grassland
28	1721+60	1769+31	4,771		Orchard
29	1769+31	1813+33	4,402		Orchard; riparian forest
30	1813+33	1902+00	8,867		Orchard
31	1902+00	1958+00	5,600		Orchard; ruderal grassland
32	1958+00	1989+00	3,100		Orchard
33	1989+00	2122+00	13,300		Orchard
34	2122+00	2182+00	6,000		Orchard
35	2182+00	2224+00	4,200		Orchard; ruderal grassland
36	2224+00	2259+00	3,500		Orchard; ruderal grassland
37	2259+00	2290+00	3,100		Orchard; ruderal grassland
38	2290+00	2303+00	1,300		Ruderal grassland
39	2303+00	2319+00	1,600		Ruderal grassland
40	2319+00	2359+00	4,000		Ruderal grassland
41	2359+00	2368+00	900	Thermalito Afterbay	Ruderal grassland

Note: Certain planning and engineering studies for the feasibility study area make reference to segments within the planning area under which the reaches above are grouped. These segment designations do not have substantial bearing on the alternatives descriptions, environmental setting, or determination of effects and thus for simplicity are not used in this document.

The new study paradigm recognizes that no single factor, including net national economic development benefit, should provide the basis for the USACE decision for a recommendation for Federal investment. Alternative comparison and selection recognizes that there is no single "best" plan, and there are a variety of approaches (quantitative and qualitative) to multi-criteria decision making.

2.1.1 Project Purpose and Need

The purpose of the Sutter Basin Pilot Feasibility Study is to investigate and determine the extent of Federal interest in plans that reduce flood risk to the Sutter Basin in Sutter and Butte Counties. This report: (1) assesses the risk of flooding; (2) describes a range of alternatives formulated to reduce flood risk; and (3) identifies a tentatively selected plan (TSP) for implementation. This report constitutes both a draft Feasibility Report that describes a USACE "pilot" planning process followed to identify the TSP, and an Environmental Impact Statement/Environmental Impact Report (EIS/EIR) required to comply with the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA). Following public and governmental agency review, this draft report will be finalized and submitted to Headquarters, USACE, for review and approval, then transmitted to Congress for recommended project authorization. Project construction would also be dependent upon Congressional appropriation of funding for the Federal share of the project.

A high risk of flooding from levee failure threatens the public safety of approximately 95,000 people, as well as property and critical infrastructure throughout the Sutter Basin study area. Past flooding events have caused loss of life and extensive economic damages. Recent geotechnical analysis and evaluation of past levee performance indicate the existing project levees, which are part of the authorized Sacramento River Flood Control Project, do not meet current U.S. Army Corps of Engineers (USACE) levee design criteria, and are at risk of breach failure at stages less than overtopping of the levees, as has been shown to be true of many of the existing levees within California's Central Valley.

2.1.2 Federal Objectives

In the Flood Control Act of 1970, Congress identified four equal national objectives for use in water resources development planning. These objectives are national economic development (NED), regional economic development (RED), environmental equality (EQ), and social well being (other social effects or OSE). These four categories are known as the System of Accounts, whereby each proposed plan can be easily compared with the no-action plan and other alternatives. The Federal objective identified in the P&G is:

> "The Federal objective of water and related land resources planning is to contribute to national economic development consistent with protecting the Nation's environment, pursuant to national environmental statues, applicable executive orders, and other Federal planning requirements."

In Section 2031 of Water Resources Development Act of 2007, Congress instructed the Secretary of the Army to develop a new P&G for USACE (Public Law 110-114). As a result, the P&G is being revised to include a number of important changes. These changes are expressed in the following proposed new Federal objectives statement:

> "The national objective of water and related land resources planning is to foster environmentally sound, efficient use of the Nation's resources consistent with public safety. This can be accomplished through watershed analyses that recognize the interdependency of water uses. This is strengthened by capitalizing on a collaborative planning and implementation process which incorporates fully

informed participation from Federal agencies, non-Federal interests, non-governmental organizations, State and local and Tribal governments, and a full range of water users and stakeholders."

"Water and related land resources planning that is consistent with the national planning objective seeks to incorporate some or all of these elements: facilitate sustainable national economic development, encourage wise use of water and related land resources – including flood plains, and flood-prone coastal areas, support the protection and restoration of significant aquatic ecosystems, promote the integration and improvement of how the Nation's water resources are managed; and reduce vulnerabilities and losses due to natural disasters."

The Federal objective is not specific enough for the development of a water resource project. The formulation of alternative plans requires the identification of study-specific planning objectives.

2.1.3 Non-Federal Objectives

The State of California, recognizing the continuing risk of flooding within the Central Valley, has enacted the Central Valley Flood Protection Act (CVFPA) and related legislation that establishes in California law the objective of providing 200-year (1/200 or 0.5% annual exceedance probability) protection to urban and urbanizing areas. Additionally, the CVFPA requires an immediate analysis of the condition of the system levees, an action plan for achieving the desired level of protection, and associated actions to reduce residual risks to development within the protected area.

In addition to complying with the state requirement, the non-Federal sponsors seek to reduce residual risk to the rural south portion of the Sutter Basin for sustainable high-value agricultural operations.

2.1.4 Planning Objectives

Planning objectives for the SBPFS are more specific than the Federal and non-Federal objectives and reflect the problems and opportunities in the study area; an objective is developed to address each of the identified problems and opportunities. Planning objectives represent desired positive changes to the future without-project conditions. All of the objectives focus on activity within the study area and within the 50-year period of analysis.

The planning objectives are:

- Reduce the risk to life, health, public safety and critical infrastructure due to flooding.
- Reduce the risk of property damage due to flooding.
- In conjunction with FRM, improve ecosystem functions and values.
- In conjunction with FRM, improve the public's access to and use of outdoor recreational opportunities in the study area.

As discussed above, it is anticipated the construction of the project would be divided into six separate construction contracts (i.e., A, B, C-1, C-2, D-1 and D-2). Although subject to change, the most current information for the six contracts and their respective areas is provided in Table 2-2.

Table 2-2. Feasibility Study Proposed Construction by Contract, Reach, and Year of Construction

Contract	A	*Star Bend	B	C1	C2	D1	D2
Corresponding Reach	2–5	6	7–12	13–18	19–25	26–33	34–41
Proposed Year of Construction	2018–2019	2018–2019	2017–2018	2013–2014	2014–2015	2015–2016	2016–2017

* Included as part of Contract A analysis.

2.1.5 Project Description

The two construction alternatives analyzed in detail through the NEPA process would each accomplish the identified project purpose. However, they would accomplish the project purpose to varying extents, with varying levels of benefits and varying adverse impacts to the aquatic ecosystem.

The following is a summary of project elements for each alternative. In general, Alternative SB-8 entails the greatest amount of levee improvement work and SB-7 the least amount. These alternatives are described in greater detail in Chapter 3 of the integrated report and EIS/EIR.

Alternative SB-8 includes:

41 reaches (2A-North to 41) along the FRWL alignment, beginning at station 180+00 (approximately 2,500 feet south of Laurel Avenue) and ending at station 2368+00 (Thermalito Afterbay). The proposed project features and measures for this alternative include:

- Soil-Bentonite Cutoff Walls
- Deep Soil Mix Cutoff Walls
- Jet Grouting Cutoff Walls
- Seepage Berms
- Levee Relocations
- Canal Relocations
- Embankment Reconstruction/Landside Toe Fill
- Erosion Protections
- Closure Structure
- Utility Improvements
- Utility Relocations
- Structural Relocations

These proposed features and measures will rehabilitate, replace, or tie in and function in junction with the existing system. The existing system includes the following features:

- Existing Embankment
- Existing Cutoff Walls

- Existing Stability Berms
- Existing Relief Wells
- Existing Closure Structures
- Existing Toe Drains

Table 2-3 identifies the construction activities that would occur with each reach.

Table 2-3. SBFS Flood Management Measures by Reach

Reach	Length (feet)	Proposed Action Flood Management Measure
2A	2,250	180+00 to 202+50, 100 ft. wide undrained seepage berm. Seepage berm 5 ft. thick at berm toe. 180+00 to 202+50, Cutoff wall extending to an elevation of 25 ft.
2B	1,616	202+50 to 218+66, cutoff wall extending to an elevation of 25' with 100'-wide undrained seepage berm. Seepage berm 5' thick at berm toe.
3	8,200	218+66 to 230+00, cutoff wall extending to an elevation of 25' with 100'-wide undrained seepage berm. Seepage berm 5' thick at berm toe. 230+00 to 250+00, cutoff wall tip elevation (-)35'. 250+00 to 289+00, cutoff wall tip elevation (-)20'. 289+00 to 300+66, cutoff wall tip elevation (-)12'.
4	11,001	300+66 to 312+00 cutoff wall tip elevation 15'. 312+00 to 349+00 cutoff wall tip elevation 15'. 349+00 to 368+00 cutoff wall tip elevation 10'. 368+00 to 410+67 cutoff wall tip elevation 20'.
5	6,801	410+67 to 417+00, cutoff wall tip elevation 20'. 417+00 to 425+00, cutoff wall tip elevation 10'. 425+00 to 456+00, cutoff wall tip elevation 15'. 456+00 to 475+35, cutoff wall tip elevation 15' with 300' wide undrained seepage berm. Seepage berm 5' thick at berm toe. 475+35 to 478+68 cutoff wall tip elevation 15'.
6	3,169	478+68 to 510+00, No Proposed Flood Management Measures 510+00 to 510+50, potential pipe crossing work to install positive closure device and correct pipe size.
7	8,563	510+37 to 512+00, no flood management required. 512+00 to 514+00, cutoff wall 514+00 to 526+00, cutoff wall tip elevation 15'. 526+00 to 570+00, cutoff wall tip elevation (-)5'. 545+00 to 570+00, relief wells with 60' spacing and 50' depth over one half of the length, distributed at various locations over this stretch of levee. 570+00 to 575+00, cutoff wall tip elevation 5'. 575+00 to 595+00, cutoff wall tip elevation (-)10'. 595+00 to 596+00, cutoff wall tip elevation 15'.

Reach	Length (feet)	Proposed Action Flood Management Measure
8	5,875	596+00 to 654+75, cutoff wall tip elevation 15'.
9	5,175	654+75 to 670+00, cutoff wall tip elevation 15'. 670+00 to 697+00, cutoff wall tip elevation 20'. 697+00 to 706+50: cutoff wall tip elevation 10'.
10	6,750	706+50 to 726+00, cutoff wall tip elevation (-)10'. 726+00 to 746+00, cutoff wall tip elevation (-)5'. 746+00 to 754+50, cutoff wall tip elevation 5'. 754+50 to 774+00, cutoff wall tip elevation 25'
11	5,600	774+00 to 784+50, cutoff wall tip elevation 25'. 784+50 to 827+50, cutoff wall tip elevation 5'. 827+50 to 830+00, cutoff wall tip elevation 25'
12	1,500	832+30, relocate two 24-inch sewer pipes.
13	8,200	844+50 to 923+75: cutoff wall tip elevation (-)38'. Full levee degrade from 844+50 to 897+50.
14	2,740	952+00 investigation of 12 kV cable to determine if it meets Title 23 requirements.
15	1,410	No flood management measures required.
16	11,150	Closure of gap in cutoff wall at 5th Street bridge crossing around Station 1007+00, cutoff wall tip elevation 40'. Closure of gap in cutoff wall at 10th Street bridge crossing around Station 1026+00, by using a seepage berm within the abandoned railroad tunnel. 1077+85 to 1080+00, cutoff wall tip elevation 30' and backfill landside toe depression. Miscellaneous landside encroachment relocations/removals.
17	5,086	1080+00 to 1089+00, cutoff wall tip elevation 30' and backfill landside toe depression. 1089+00 to 1125+00, cutoff wall tip elevation 35' and backfill landside toe depression. 1125+00 to 1130+86, cutoff wall tip elevation 0'.
18	8,299	1130+86 to 1151+50, cutoff wall tip elevation 0'. 1151+50 to 1159+50: cutoff wall tip elevation 30'. 1159+50 to 1169+50: cutoff wall tip elevation 25'. 1169+50 to 1189+50: cutoff wall tip elevation 30'. 1189+50 to 1209+50: cutoff wall tip elevation 40'. 1209+50 to 1213+85: cutoff wall tip elevation 35'.
19	8,398	1213+85 to 1219+75, cutoff wall tip elevation 35'. 1219+75 to 1224+00, cutoff wall tip elevation 5'. 1224+00 to 1238+00, cutoff wall tip elevation (-)28'. 1238+00 to 1248+00, cutoff wall tip elevation (-)42'. 1248+00 to 1268+75, cutoff wall tip elevation 3'. 1268+75 to 1297+83, cutoff wall tip elevation 35'.

Reach	Length (feet)	Proposed Action Flood Management Measure
20	7,650	1297+83 to 1298+75, cutoff wall tip elevation 35'. 1298+75 to 1359+00, cutoff wall tip elevation 50'. 1359+00 to 1369+00: cutoff wall tip elevation 40'. 1369+00 to 1374+33: cutoff wall tip elevation 32'.
21	5,950	1374+33 to 1386+00 cutoff wall tip elevation 32'. 1386+00 to 1408+00: cutoff wall tip elevation 55'. 1408+00 to 1432+50: cutoff wall tip elevation 40'. 1432+50 to 1433+83: Levee relocation (20 ft riverward, transition only) 1429+00 to 1433+83 Sutter Butte Main Canal relocation.
22	7,000	1433+83 to 1450+00: Levee relocation (20ft riverward) 1451+50 to 1451+50: Levee relocation (20ft riverward, transition only) 1451+50 to 1468+83, cutoff wall tip elevation 50'. 1455+00 to 1461+00, full levee degrade and reconstruction. 1468+83 to 1503+83, cutoff wall tip elevation 55'.
23	10,554	1503+83 to 1508+50, cutoff wall tip elevation 55'. 1508+50 to 1528+75, cutoff wall tip elevation 60'. 1528+75 to 1566+50, cutoff wall tip elevation 55'. 1566+50 to 1608+75, cutoff wall tip elevation 60'. 1608+50 to 1609+37: Levee relocation (20ft riverward, transition only)
24	1,449	1609+37 to 1612+00: Levee relocation (20ft riverward, transition only) 1612+00 to 1623+00: Levee relocation (20ft riverward) 1623+00 to 1623+86: Levee relocation (20ft riverward, transition only)
25	5,051	1623+86 to 1624+50: Levee relocation (20ft riverward, transition only) 1673+00 to 1674+37: Levee relocation (20ft riverward, transition only) 1639+00, replace two 24-inch steel storm drain pipes.
26	3,274	1674+37 to 1675+00: Levee relocation (20ft riverward, transition only) 1675+00 to 1707+11: Levee relocation (20ft riverward) Reconstruction of landside slope extends down to elevation of bottom of canal.
27	1,449	1707+11 to 1721+60: Levee relocation (20ft riverward)
28	4,771	1721+60 to 1753+00: Levee relocation (20ft riverward) 1753+00 to 1754+50: Levee relocation (20ft riverward, transition only) 1752+00 to 1766+00: Sutter Butte Main Canal Relocation 1766+00 to 1769+31, cutoff wall tip elevation 45'.
29	4,402	1770+00, 1785+24, 1785+55, 1792+96, 1799+44, 1809+65, storm drain and irrigation pipe replacements.
30	8,867	1813+33 to 1816+50, cutoff wall tip elevation 80', with full levee degrade and reconstruction. 1816+50 to 1848+25, cutoff wall tip elevation 30'. 1848+25 to 1866+00, cutoff wall tip elevation 70'. 1866+00 to 1877+75, cutoff wall tip elevation 47'. 1877+75 to 1883+00, cutoff wall tip elevation 40'. 1883+00 to 1902+00, cutoff wall tip elevation 27'.

Reach	Length (feet)	Proposed Action Flood Management Measure
31	5,600	1902+00 to 1907+50, cutoff wall tip elevation 27'. 1907+50 to 1917+50, cutoff wall tip elevation 44'. 1907+92 to 1909+42, waterside slope flattening or other remedial measure. 1917+50 to 1927+50, cutoff wall tip elevation 75'. 1927+50 to 1937+00, cutoff wall tip elevation 50'. 1937+00 to 1958+00, cutoff wall tip elevation 40'.
32	3,100	1958+00 to 1971+80, cutoff wall tip elevation 40'. 1971+80 to 1987+25, cutoff wall tip elevation 48'. 1987+25 to 1989+00, cutoff wall tip elevation 10'.
33	13,300	1989+00 to 2002+00, cutoff wall tip elevation 10'. 2002+00 to 2016+75, cutoff wall tip elevation 90'. 2016+75 to 2036+75, cutoff wall tip elevation 20'. 2036+75 to 2041+00, cutoff wall tip elevation 53'. 2041+00 to 2067+00, cutoff wall tip elevation 38'. 2067+00 to 2088+00, cutoff wall tip elevation 33'. 2088+00 to 2122+00, cutoff wall tip elevation 90'.
34	6,000	2122+00 to 2137+00, cutoff wall tip elevation 90'. 2137+00 to 2148+00, cutoff wall tip elevation 20'. 2148+00 to 2164+00, cutoff wall tip elevation 90'. 2164+00 to 2182+00, cutoff wall tip elevation 50'.
35	4,200	2182+00 to 2196+50, cutoff wall tip elevation 40'. 2196+50 to 2212+00, cutoff wall tip elevation 45'. 2212+00 to 2218+25, cutoff wall tip elevation 50'. 2218+25 to 2224+00, cutoff wall tip elevation 55'.
36	3,500	2224+00 to 2233+50, cutoff wall tip elevation 55'. 2233+50 to 2245+75, cutoff wall tip elevation 70'. 2245+75 to 2259+00, cutoff wall tip elevation 42'.
37	3,100	2259+00 to 2277+00, cutoff wall tip elevation 42'. 2277+00 to 2290+00, cutoff wall tip elevation 45'.
38	1,300	2290+00 to 2292+00 cutoff wall to elevation +45'. 2290+00 to 2303+00 construct 11' high seepage berm, 50' wide at the top and 170' wide from levee centerline.
39	1,600	2312+10, remove 24" storm drain pipe.
40	4,000	2331+00 to 2335+00, construct 120'-wide seepage berm. 2335+00 to 2359+00, 100'-wide seepage berm. Berms are 9' thick at the levee toe and 3' thick at the berm toe.
41	900	2359+00 to 2368+00, construct 100'-wide seepage berm with 1'-thick drain layer. 2360+00; fill waterside pit (up to elevation 130').

Encroachments

Existing facilities found within the footprint of an alternative may require removal and replacement nearby, abandonment, or relocation. Encroachments are numerous (over 400 identified) along the Feather River West Levee and may need to be addressed if they present a threat to the stability of the levee, do not currently comply with the levee encroachment criteria, or would be disrupted or otherwise impacted by construction activities. Typical encroachments include pressure pipelines (water supply pipelines from waterside pump stations and drainage pipelines from landside drainage pump stations), gravity drainage pipes, gas lines, telephone utilities, overhead utilities, structural encroachments, and other types and variations. Debris from structure and embankment fill material of poor quality would be hauled offsite to a permitted disposal site within 20 miles of the removal location.

Vegetation Removal

Bulldozers would be used to remove woody and herbaceous vegetation from the direct construction footprint and the minimum areas needed for project staging and access routes. Any vegetation removed as part of direct construction activities would not be replaced at that location and would require offsite, in-kind mitigation, to be determined in consultation with the appropriate resource agencies.

More extensive root removal may be required, depending upon the location, size, and type of tree; the quantity, orientation, and size of the roots; the dimensions of the levee (or floodwall); the composition of the levee and foundation; and the levee features that address seepage and underseepage. Less extensive root removal may be justified where roots from adjacent trees would be unduly damaged. Any excavation resulting from the above actions would be backfilled with engineered fill using appropriate placement, moisture conditioning, and compaction methods. Additional measures for removing non-compliant vegetation are listed below.

- Ensure that the resulting void is free of organic debris.
- Cut poles to salvage propagation materials for replanting, such as willows and cottonwoods.
- Conduct hand clearing using chainsaws and trimmers.
- Conduct mass clearing using bulldozers.

Debris from vegetation removal would be hauled offsite to a permitted disposal site within 20 miles of the removal location.

Construction Staging, Access, and Temporary Facilities

The contractor would be responsible for obtaining all required local, state, and Federal permits for any staging areas outside of these limits. Staging areas would be used for equipment staging, storage of equipment and materials, mobile project offices, construction staff parking, etc.

To facilitate project construction, temporary earthen ramps would be constructed for equipment access between the levee crown and the staging area(s). The earthen ramps would be removed when construction is complete.

Cutoff wall construction requires temporary establishment of an onsite slurry batch plant that would occupy approximately 1–2 acres. Batch plants would be located at approximately 1-mile

intervals within the project footprint. The batch plant site would likely contain tanks for water storage, bulk bag supplies of bentonite, bentonite storage silos, a cyclone mixer, pumps, and two generators that meet air quality requirements. The site would also accommodate slurry tanks to store the blended slurries temporarily until they are pumped to the work sites. Slurry ingredients would be mixed with water at the batch plant and the mixture would be pumped from the tanks through pipes to the cutoff wall construction work sites. The batch plant would produce two different slurry mixes, one for trench stabilization and one for the soil backfill mix. Therefore, two slurry pipes or hoses, typically 4- or 6-inch high-density polyethelene pipes, would be laid on the ground and would extend to all work sites. An additional pipe may be used to supply water to the work sites.

Staging areas, access routes, and other temporary construction areas would be located away from wetlands, riparian habitat, oak woodlands, special-status wildlife habitat, known cultural resources, or other sensitive areas and would be limited to disturbed or ruderal grasslands subject to review by USACE and Federal and state resource agencies.

Material Importation, Reuse, and Borrow

Materials imported to the project site would include water, bentonite, cement, incidental construction support materials, aggregate base rock, asphalt, concrete, hydroseed, and embankment fill soil. Each alternative would require the use of large quantities of fill soil, or borrow. To meet borrow demands, embankment fill material excavated as part of construction would be evaluated for reuse. Embankment fill material deemed suitable would be used as part of levee reconstruction and berms.

Borrow Volume

The total volume of material required is 1,619,250 cubic yards. The quantities were calculated assuming a 20% shrinkage factor between excavation at the borrow site and placement at the levee. Only material suitable for placement in levee construction may be borrowed (HDR et al. 2012). These materials are identified as low to medium plasticity soils classified in accordance with American Society for Testing and Materials D 2487 as silty sand (SM) and clayey sand (SC), silt (ML), or clay (lean clay [CL] or fat clay [CH]). The materials should have a Liquid Limit (LL) less than or equal to 45 (may be extended up to 55 with justification and approval from USACE and the CVFPB), a Plasticity Index (PI) greater than or equal to 12 and less than 40, and a fines content greater than or equal to 30%. The material should be free from visible organics and be no greater than 2 inches in any dimension.

Borrow Site Selection Factors

The first choice for fill or borrow material would be from a local commercial quarry or other permitted source. In the event that material is desired from a source that is not presently permitted, for reasons such as quality, proximity, or volume available, soil supply protection measures would be implemented. One such measure would be maximizing on-site use through gradation, placement, and treatment. Another measure would be the preservation and replacements of topsoil at borrow sites, so that they could be continued to be used for their current use or otherwise returned to their pre-project condition. As part of borrow operations, the upper 12 inches of topsoil would be set aside and replaced after project construction in each construction season. After the project is

completed, the borrow site would be re-contoured and reclaimed. An additional measure would be independent environmental documentation and regulatory compliance, as required.

Factors determining borrow sources and sites are (followed by a description of each factor and discussion of potential borrow sources).

- Hauling distance and haul route
- Depth to groundwater
- Royalty fees
- Post-construction land use
- Environmental factors

Hauling Distance and Routes. The cost for borrow site excavation and hauling is directly related to the distance required to haul the material and the route by which the materials must be transported. To the extent possible, sites should be selected that minimize haul route length and the use of public roadways (Wood Rodgers 2011).

Depth to Groundwater. Because the top layer of a borrow site must be removed and stockpiled to exclude organics from the borrow material, it is economical to maximize the depth of the excavation. This maximum depth is typically governed by the normal seasonal depth of groundwater. Once excavation extends to within a few feet of the groundwater table, additional expense is incurred to implement dewatering at the site. Groundwater elevations generally fluctuate throughout the year and can be influenced by standing water or irrigation activities on adjacent lands. Typically, groundwater depths are higher at the beginning of spring, and become deeper toward the end of summer (Wood Rodgers 2011).

Royalty Fees. Royalty fees for material excavated directly affect the cost of the borrow and also typically trigger more substantial permitting requirements. It is desirable to find a property owner who wishes to have excavation carried out for his own purposes, such as creating a detention basin to support future development, so that royalty fees and a SMARA permit are avoided (Wood Rodgers 2011).

Post-Construction Land Use. The post-construction use of the property can also effect the depth of excavation. Borrow sites must be free draining after the material is excavated, and therefore cannot be extended deeper than the offsite drainage facilities can accommodate (Wood Rodgers 2011).

Environmental Factors. Environmental factors, including the need for mitigation for special-status species and wetlands encroachments, are also a factor in selecting borrow sites. Consideration should also be given to haul routes when evaluating environmental effects. Routes which could be unavailable during the early months of the construction season due to the presence of nesting raptors should be avoided (Wood Rodgers 2011). If waterside borrow sites outside the construction footprint are needed, only sites that do not impact woody vegetation associated with fish-inhabited waters should be considered. All sites will be surveyed for potential wildlife habitat, jurisdictional waters, cultural resources, and other environmental regulatory triggers prior to use, and environmental documentation and permits will be secured independently or supplemental to the project documentation and permits.

Borrow Sources and Proposed Borrow Sites

Fill or borrow material may be purchased from a local commercial quarry or other permitted source; however, there are not currently any sites near the project area that would supply the volume and type of material required. Consequently, the most likely possibility is for fill to be purchased from local landowners willing to sell borrow material.

Five borrow sites have been identified in the project area. Each site was investigated to determine the quantity of available material, hauling distance, material composition, groundwater elevation, and prospects for acquisition. The purpose of the investigation was to identify the sites with the greatest potential to economically provide material for the project. Economical hauling has been determined to be within a 2-miles radius and marginally economic hauling within a 10-mile radius. As a result of the borrow analysis, sufficient fill volume is present within an approximate 10-mile, one-way haul distance from the area of construction.

A potential borrow sites' utilization would be maximized through gradation, placement, and treatment so that they could continue to be used for their current use or otherwise returned to their pre-project condition. As part of borrow operations, the upper 4–6 inches of topsoil would be set aside and replaced after construction in each construction season. After the project is completed, the borrow site would be re-contoured and reclaimed.

Through outreach efforts, a number of sites owned by individuals or government agencies willing to sell their property or provide material on a cubic yard basis. Figure 1 shows the locations of the five potential borrow sites identified and the proposed haul routes to the construction area.

North Valley Property

The North Valley property is owned by North Valley Properties, LLC and is located south of Ella Road between Feather River Boulevard and Arboga Road. The Wheeler Ranch housing development is proposed at the site. Borrow for the project would be taken from the northeast corner of the property to create a 24.5 acre detention pond (referred to as referred to as the Drainage Basin C Regional Detention Pond but commonly referred to as the South Ella Detention Pond). The Ella Basin is being constructed as part of Reclamation District No. 784's Master Drainage Plan. Historically, the site was cultivated for agricultural purposes. Currently, the site is disked ruderal grassland with some roads cut in the southern portion of the property for the Wheeler Ranch development. The material at this site is anticipated to be CL from a depth of 18–22 feet, followed by silt-sand material below a depth of 22–25 feet. The depth of excavation is anticipated to be 15–20 feet and the yield of material from this site could be 400,000–500,000 cubic yards. Borrow material from this site would be used for work in Contract C-1 and C-2, and Contract B. If borrow material is remaining, it may also be used for Contract D-1 and D-2.

The haul route to the northern portion of Contract C from the North Valley Property would be west on Ella Avenue to north on Feather River Boulevard to north on SR70 to west on SR20/Colusa Avenue to north on Live Oak Boulevard to north on SR99 to east on Paseo Avenue. Additional access route to the levee along northbound SR99 would be north on Kent Avenue to east on Koch Lane. Additional access routes to the levee along northbound Live Oak Boulevard would be east on Morse Road, east on Rednall Road and east on Market Street to east on Lynn Way. Additional access routes to the levee along westerly SR20/Colusa Avenue would be North on Sutter Street/Market Street to east on Lynn Way.

The haul route to the southern portion of Contract C from the North Valley Property would be west on Ella Avenue to north on Feather River Boulevard to north on SR70 to west on SR20/Colusa Avenue to south on Sutter Street to south on 2nd Street to levee access. Additional access route to the levee along westerly SR20/Colusa Avenue would be south on SR99 to east on Bogue Road to south on Garden Highway to east on Shanghai Bend Road.

The post-project land use of the site would be a regional detention pond for Reclamation District No. 784.

Marler Property

The Marler property is a 10-acre property at Johnson Road near Messick Road north of Star Bend and south of Shanghai Bend. The site is currently an orchard. The depth of excavation could be upwards of 6 feet. The yield of material from this site could be up to 75,000 cubic yards. The likely haul route would be Johnson Road to Messick Road to the Garden Highway, accessing the levee near Oswald Road. The post-project land use for the property would be agricultural production, likely row crops or orchard.

Lanza Property

The Lanza property is 40 acres in size and is currently farmed in field/row crops. It is located at North Township Road and Pease Road south of Live Oak and north of Yuba City. The site has not yet been investigated to determine the types of materials present. Excavation of the site to a depth of 6 feet may occur. The yield of material from this site could be up to 200,000 cubic yards. The likely haul route would be along Pease Road directly east to the levee. The post-project land use for the property would be rice production.

City of Live Oak Detention Basin

The City of Live Oak owns the property formerly known as the Caltrans Detention Basin Site located west of SR 99 and south of Paseo Avenue. The site is currently fallow. The City of Live Oak intends to construct soccer fields and a stormwater detention basin at the site in 2013 or later. Although the site would require hauling for a short distance through a residential neighborhood, it is anticipated the residents would be amenable to the hauling as it would be a part of the public amenity constructed by the City of Live Oak. The material at this site is anticipated to be CL from a depth of 1–2.5 feet, followed by more sandy material to a depth of 6 feet. This site is approximately 25 acres, and the depth of excavation is anticipated to be 3–6 feet. The yield of material from this site could be up to 125,000 cubic yards, and would likely be used for Contract C. The haul route to the northern portion of Contract C from the City of Live Oak Detention Basin would be west crossing the canal to north to Treatment Plant Access road and west on Treatment Plant Access Road to north on Farm Access Road to north on Richards Avenue to east on Pennington Road. Additional access routes to the levee from eastbound on Pennington Road are south on SR99 to east on Paseo Avenue and north on Metteer Road to east on Riviera Road. Additional routes to the levee along northerly Metteer Road would be east on Campbell Road and east on Cooley Road.

The City of Live Oak (Schmidt, pers. comm.) reports that land at this location has historically been cultivated for agricultural purposes and that there was no evidence of any wetland or other sensitive plant or wildlife areas remaining onsite. A preliminary wetland delineation of the area conducted by HDR Engineering in December 2012 did not identify any wetland features. The previous agricultural use has displaced native species of plants and animals except those varieties capable of co-existing

with humans in urban settings. The post-project use of the site would be a community park and stormwater detention basin facility.

Oroville Wildlife Area Dredge Tailings Area

This site is within the Oroville Wildlife Area and consists of several mounds of dredge tailings on the waterside of the existing levee. The material is suitable for use in seepage berms at Reaches 40 and 41 and an adjacent levee at Reach 38. The availability of tailings in the area should be sufficient to meet the total deficit for berm material in these reaches. The excavation of the material would be coordinated to maximize hydraulic benefits from the reshaping of the overbank area. The site also represents an opportunity to provide waterside habitat enhancements. The useful area of this site could be approximately 75 acres and the depth of excavation could be upwards of 10 feet. The yield of material from this site could be up to 375,000 cubic yards. Hauling from this site would not take place on public roads. It is anticipated the contractor would use an existing waterside levee ramp (or create one), directly accessing the levee patrol road. The future land use for this site would be similar to its present day use (managed habitat area).

Post-Construction Operations and Maintenance

After construction completion, the levee and staging areas and levee slopes would be hydroseeded for erosion protection, dust abatement, and to prevent colonization of exotic vegetation.

In accordance with Federal Flood Control Regulations (33 CFR 208.10) and State requirements (California Water Code Section 8370), each year the Federal flood control facilities are inspected four times, at intervals not exceeding 90 days. DWR would inspect the system twice per year, and the local maintaining authorities would inspect it twice per year and immediately following major high water events. The findings of these inspections would be reported to the CVFPB's Chief Engineer through DWR's Flood Project Integrity and Inspection Branch.

Permanent facilities associated with relief wells include the wells themselves and surface drainage trenches to control the discharge. Inspection of the relief wells is required at least annually, and observation of flow from the wells is required during high river stages. The wells are test-pumped periodically. The collection ditch is maintained to allow free flow of water.

Because operations and maintenance activities are conducted by DWR and local flood protection districts, the effects of these activities are not part of the project and are not discussed further in this MMP.

2.1.6 Conservation Measures

The following conservation measures will be implemented during project construction to avoid and minimize effects on federally listed species.

General

Conservation Measure 1: Conduct Mandatory Biological Resources Awareness Training for All Project Personnel and Implement General Requirements

Before any ground-disturbing work (including vegetation clearing and grading) occurs in the project area, a biologist approved by USFWS, NMFS, and CDFW will conduct a mandatory biological

resources awareness training for all construction personnel about federally listed species that could potentially occur onsite (VELB, giant garter snake, and fish species). The training will include the natural history, representative photographs, and legal status of each federally listed species and avoidance and minimization measures to be implemented. Proof of personnel attendance will be provided to USFWS, NMFS, and CDFW within 1 week of the training. If new construction personnel are added to the project, the contractor will ensure that the new personnel receive the mandatory training before starting work. The subsequent training of personnel can include videotape of the initial training and/or the use of written materials rather than in-person training by a biologist. Requirements that will be followed by construction personnel are listed below.

- Where suitable habitat is present for listed species, the construction limits will be thoroughly delineated with survey tape, pin flags, orange barrier fencing, or other means, and prohibit any construction-related traffic outside these boundaries.
- Project-related vehicles will observe the posted speed limit on hard-surfaced roads and a 10-mile-per-hour speed limit on unpaved roads during travel in the project construction area.
- Project-related vehicles and construction equipment will restrict off-road travel to the designated construction areas.
- All food-related trash will be disposed of in closed containers and removed from the project construction area at least once per week during the construction period. Construction personnel will not feed or otherwise attract fish or wildlife to the project site.
- No pets or firearms will be allowed in the project construction area.
- To prevent possible resource damage from hazardous materials such as motor oil or gasoline, construction personnel will not service vehicles or construction equipment outside designated staging areas.
- Any worker who inadvertently injures or kills a federally listed species or finds one dead, injured, or entrapped will immediately report the incident to the biological monitor and construction foreman. The construction foreman will immediately notify the implementing agency, who will provide verbal notification to the USFWS Sacramento Endangered Species Office and/or the local CDFW warden or biologist within 1 working day. The implementing agency will follow up with written notification to USFWS or CDFW within 5 working days. The biological monitor will follow up with implementing agency to ensure that the wildlife agencies were notified.
- The biological monitor will record all observations of federally listed species on CNDDB field sheets and submit to CDFW.

Valley Elderberry Longhorn Beetle

Conservation measures for VELB are based on USFWS's 1999 *Conservation Guidelines for the Valley Elderberry Longhorn Beetle* (Conservation Guidelines) (U.S. Fish and Wildlife Service 1999a).

Conservation Measure 2: Fence Elderberry Shrubs to be Protected and Monitor Fencing during Construction

Elderberry shrubs/clusters within 100 feet of the construction area that will not be removed will be protected during construction. A qualified biologist (i.e., with elderberry/VELB experience), under contract to the implementing agency, will mark the elderberry shrubs and clusters that will be

protected during construction. Orange construction barrier fencing will be placed at the edge of the respective buffer areas. The buffer area distances will be proposed by the biologist and approved by USFWS. No construction activities will be permitted within the buffer zone other than those activities necessary to erect the fencing. Signs will be posted every 50 feet (15.2 meters) along the perimeter of the buffer area fencing. The signs will contain the following information:

This area is habitat of the valley elderberry longhorn beetle, a threatened species, and must not be disturbed. This species is protected by the Endangered Species Act of 1973, as amended. Violators are subject to prosecution, fines, and imprisonment.

In some cases, where the elderberry shrub dripline is within 10 feet of the work area, k-rails will be placed at the shrub's dripline to provide additional protection to the shrub from construction equipment and activities. Temporary fences around the elderberry shrubs and k-rails at shrub driplines will be installed as the first order of work. Temporary fences will be furnished, constructed, maintained, and later removed, as shown on the plans, as specified in the special provisions, and as directed by the project engineer. Temporary fencing will be 4 feet (1.2 meters) high, commercial-quality woven polypropylene, orange in color.

Buffer area fences around elderberry shrubs will be inspected weekly by a qualified biological monitor during ground-disturbing activities and monthly after ground-disturbing activities until project construction is complete or until the fences are removed, as approved by the biological monitor and the resident engineer. The biological monitor will be responsible for ensuring that the contractor maintains the buffer area fences around elderberry shrubs throughout construction. Biological inspection reports will be provided to the project lead and USFWS.

Conservation Measure 3: Conduct VELB Surveys Prior to Elderberry Shrub Transplantation

Surveys of elderberry shrubs to be transplanted will be conducted by a qualified biologist prior to transplantation. Surveys will be conducted in accordance with the Conservation Guidelines for the VELB (U.S. Fish and Wildlife Service 1999a). The biologist will survey the area surrounding the shrub to be transplanted to ensure that there aren't additional elderberry shrubs that need to be removed. Surveys will consist of counting and measuring the diameter of each stem, and examining elderberry shrubs for the presence of VELB exit holes. Survey results and an analysis of the number of elderberry seedlings/cuttings and associated native plants based on the survey results will be submitted to USFWS. The data collected during the surveys prior to transplantation will be used to determine if the implementing agency is exceeding their compensation requirements or if additional plantings are necessary. Because the project would be constructed in separate contracts, elderberry survey data for each contract will be used to rectify any discrepancies in compensation for the previous contract and to ensure that impacts to VELB are fully mitigated.

Conservation Measure 4: Water Down Construction Area to Control Dust

The implementing agency or the contractor will ensure that the project construction area will be watered down as necessary to prevent dirt from becoming airborne and accumulating on elderberry shrubs within the 100–foot buffer.

Conservation Measure 5: Compensate for Direct and Indirect Effects on Valley Elderberry Longhorn Beetle Habitat

Project impacts to VELB habitat are discussed in Section 2.3 and compensation ratios are discussed below in Section 3.4.

Giant Garter Snake

Conservation measures for giant garter snake were developed using portions of the *Programmatic Formal Consultation for U.S. Army Corps of Engineers 404 Permitted Projects with Relatively Small Effects on the Giant Garter Snake within Butte, Colusa, Glenn, Fresno, Merced, Sacramento, San Joaquin, Solano, Stanislaus, Sutter, and Yolo Counties, California* (U.S. Fish and Wildlife Service 1997).

Conservation Measure 6: Conduct Construction Activities during the Active Period for Giant Garter Snake

To the maximum extent possible, all construction activity within giant garter snake aquatic and upland habitat within 200 feet of aquatic habitat will be conducted during the snake's active period (May 1–October 1). During this timeframe, potential for injury and mortality are lessened because snakes are actively moving and avoiding danger. Canal relocation at Reaches 22 and 28 to 29 and pipe reconstruction at Reaches 26–28 must be conducted when the canal is dry (February–March). Additional protective measures will be implemented at these locations (see Conservation Measure 14 below).

Conservation Measure 7: Install and Maintain Exclusion and Construction Barrier Fencing around Suitable Giant Garter Snake Habitat

To reduce the likelihood of giant garter snakes entering the construction area, the implementing agency will install exclusion fencing and orange construction barrier fencing along the portions of the construction area that are within 200 feet of suitable aquatic and upland habitat. The exclusion and construction barrier fencing will be installed during the active period for giant garter snakes (May 1–October 1) to reduce the potential for injury and mortality during this activity.

The construction specifications will require that the implementing agency or its contractor retain a qualified biologist to identify the areas that are to be avoided during construction. Areas adjacent to the directly affected area required for construction, including staging and access, will be fenced off to avoid disturbance in these areas. Before construction, the contractor will work with the qualified biologist to identify the locations for the barrier fencing and will place flags or flagging around the areas to be protected to indicate the locations of the barrier fences. The protected area will be clearly identified on the construction specifications. The fencing will be installed the maximum distance practicable from the aquatic habitat areas and will be in place before construction activities are initiated.

The exclusion fencing will consist of 3 foot-tall silt fencing buried at least 4–6 inches below ground level. The exclusion fencing will ensure that giant garter snakes are excluded from the construction area and that suitable upland and aquatic habitat is protected throughout construction. The construction barrier fencing will be commercial-quality, woven polypropylene, orange in color, and 4 feet high (Tensor Polygrid or equivalent). The fencing will be tightly strung on posts with a maximum of 10-foot spacing.

Barrier and exclusion fences will be inspected daily by a qualified biological monitor during ground-disturbing activities and weekly after ground-disturbing activities until project construction is complete or until the fences are removed, as approved by the biological monitor and the resident engineer. The biological monitor will be responsible for ensuring that the contractor maintains the buffer area fences around giant garter snake habitat throughout construction. Biological inspection reports will be provided to the project lead and USFWS.

Conservation Measure 8: Minimize Potential Impacts on Giant Garter Snake Habitat

The implementing agency will implement the following measures to minimize potential impacts on giant garter snake habitat.

- Staging areas will be located at least 200 feet from suitable giant garter snake habitat.
- Any dewatered habitat will remain dry for at least 15 consecutive days after April 15 and prior to excavating or filling of the dewatered habitat.
- Vegetation clearing within 200 feet of the banks of suitable giant garter snake aquatic habitat will be limited to the minimum area necessary. Avoided giant garter snake habitat within or adjacent to the project area will be flagged and designated as an environmentally sensitive area, to be avoided by all construction personnel.
- The movement of heavy equipment within 200 feet of the banks of suitable giant garter snake aquatic habitat will be confined to designated haul routes to minimize habitat disturbance.

Conservation Measure 9: Prepare and Implement a Stormwater Pollution Prevention Plan

Because ground disturbance for the project would be greater than 1 acre, the implementing agency would obtain coverage under the U.S. Environmental Protection Agency's (EPA's) National Pollutant Discharge Elimination System (NPDES) general construction activity stormwater permit. The Central Valley Regional Water Quality Control Board (RWQCB) administers the NPDES stormwater permit program in Sutter and Butte Counties. Obtaining coverage under the NPDES general construction activity permit generally requires that the project applicant prepare a stormwater pollution prevention plan (SWPPP) that describes the BMPs that would be implemented to control accelerated erosion, sedimentation, and other pollutants during and after project construction. The SWPPP would be prepared prior to commencing earth-moving construction activities.

The specific BMPs that would be incorporated into the erosion and sediment control plan and SWPPP would be site-specific and would be prepared by the construction contractor in accordance with the California RWQCB Field Manual. However, the plan likely would include, but not be limited to, one or more of the following standard erosion and sediment control BMPs.

- **Timing of construction.** The construction contractor will conduct all construction activities during the typical construction season to avoid ground disturbance during the rainy season.
- **Staging of construction equipment and materials.** To the extent possible, equipment and materials will be staged in areas that have already been disturbed.
- **Minimize soil and vegetation disturbance.** The construction contractor will minimize ground disturbance and the disturbance/destruction of existing vegetation. This will be accomplished in part through the establishment of designated equipment staging areas, ingress and egress

corridors, and equipment exclusion zones prior to the commencement of any grading operations.

- **Stabilize grading spoils.** Grading spoils generated during the construction will be temporarily stockpiled in staging areas. Silt fences, fiber rolls, or similar devices will be installed around the base of the temporary stockpiles to intercept runoff and sediment during storm events. If necessary, temporary stockpiles may be covered with an appropriate geotextile to increase protection from wind and water erosion.
- **Install sediment barriers.** The construction contractor may install silt fences, fiber rolls, or similar devices to prevent sediment-laden runoff from leaving the construction area. Natural/biodegradable erosion control measures (i.e., coir rolls, straw wattles or hay bales) will be used. Plastic monofilament netting (erosion control matting) will not be allowed because animals can become caught in this type of erosion control material.
- **Stormwater drain inlet protection**. The construction contractor may install silt fences, drop inlet sediment traps, sandbag barriers, and/or other similar devices.
- **Permanent site stabilization**. The construction contractor will install structural and vegetative methods to permanently stabilize all graded or otherwise disturbed areas once construction is complete. Structural methods may include the installation of biodegradable fiber rolls and erosion control blankets. Vegetative methods may involve the application of organic mulch and tackifier and/or the application of an erosion control seed mix. Implementation of a SWPPP will substantially minimize the potential for project-related erosion and associated adverse effects on water quality.

Conservation Measure 10: Prepare and Implement a Bentonite Slurry Spill Contingency Plan (Frac-Out Plan)

Before excavation begins, the implementing agency would ensure the contractor would prepare and implement a bentonite slurry spill contingency plan (BSSCP) for any excavation activities that use pressurized fluids (other than water). If the contactor prepares the plan, it would be subject to approval by USACE, NMFS, and SBFCA before excavation can begin. The BSSCP would include measures intended to minimize the potential for a frac-out (short for "fracture-out event") associated with excavation and tunneling activities; provide for the timely detection of frac-outs; and ensure an organized, timely, and "minimum-effect" response in the event of a frac-out and release of excavation fluid (i.e., bentonite). The BSSCP would require, at a minimum, the following measures.

- If a frac-out is identified, all work will stop, including the recycling of the bentonite fluid. In the event of a frac-out into water, the location and extent of the frac-out will be determined, and the frac-out will be monitored for 4 hours to determine whether the fluid congeals (bentonite will usually harden, effectively sealing the frac-out location).
- NMFS, CDFW, and the RWQCB will be notified immediately of any spills and will be consulted regarding clean-up procedures. A Brady barrel will be onsite and used if a frac-out occurs. Containment materials, such as straw bales, also will be onsite prior to and during all operations, and a vacuum truck will be on retainer and available to be operational onsite within notice of 2 hours. The site supervisor will take any necessary follow-up response actions in coordination with agency representatives. The site supervisor will coordinate the mobilization of equipment stored at staging areas (e.g., vacuum trucks) as needed.

- If the frac-out has reached the surface, any material contaminated with bentonite will be removed by hand to a depth of 1-foot, contained, and properly disposed of, as required by law. The drilling contractor will be responsible for ensuring that the bentonite is either properly disposed of at an approved Class II disposal facility or properly recycled in an approved manner.
- If the bentonite fluid congeals, no other actions, such as disturbance of the streambed, will be taken that will potentially suspend sediments in the water column.
- The site supervisor has overall responsibility for implementing this BSSCP. The site supervisor will be notified immediately when a frac-out is detected. The site supervisor will be responsible for ensuring that the biological monitor is aware of the frac-out, coordinating personnel, response, cleanup, regulatory agency notification and coordination to ensure proper clean-up, disposal of recovered material, and timely reporting of the incident. The site supervisor will ensure all waste materials are properly containerized, labeled, and removed from the site to an approved Class II disposal facility by personnel experienced in the removal, transport, and disposal of drilling mud.
- The site supervisor will be familiar with the contents of this BSSCP and the conditions of approval under which the activity is permitted to take place. The site supervisor will have the authority to stop work and commit the resources (personnel and equipment) necessary to implement this plan. The site supervisor will ensure that a copy of this plan is available (onsite) and accessible to all construction personnel. The site supervisor will ensure that all workers are properly trained and familiar with the necessary procedures for response to a frac-out, prior to commencement of excavation operations.

Conservation Measure 11: Prepare and Implement a Spill Prevention, Control, and Counter-Measure Plan

A spill prevention, control, and counter-measure plan (SPCCP) is intended to prevent any discharge of oil into navigable water or adjoining shorelines. the implementing agency or its contractor would develop and implement an SPCCP to minimize the potential for and effects from spills of hazardous, toxic, or petroleum substances during construction and operation activities. The SPCCP would be completed before any construction activities begin. Implementation of this measure would comply with State and Federal water quality regulations. The SPCCP would describe spill sources and spill pathways in addition to the actions that would be taken in the event of a spill (e.g., an oil spill from engine refueling would be immediately cleaned up with oil absorbents). The SPCCP would outline descriptions of containments facilities and practices such as doubled-walled tanks, containment berms, emergency shut-offs, drip pans, fueling procedures and spill response kits. It would also describe how and when employees are trained in proper handling procedure and spill prevention and response procedures.

The implementing agency would review and approve the SPCCP before onset of construction activities and routinely inspect the construction area to verify that the measures specified in the SPCCP are properly implemented and maintained. The implementing agency would notify its contractors immediately if there is a non-compliance issue and would require compliance.

The Federal reportable spill quantity for petroleum products, as defined in 40 CFR 110, is any oil spill that results in one or more of the following.

- Violates applicable water quality standards.

- Causes a film or sheen on or discoloration of the water surface or adjoining shoreline.
- Causes a sludge or emulsion to be deposited beneath the surface of the water or adjoining shorelines.

If a spill is reportable, the contractor's superintendent would notify the implementing agency, and the implementing agency would take action to contact the appropriate safety and cleanup crews to ensure that the SPCCP is followed. A written description of reportable releases must be submitted to the Central Valley RWQCB. This submittal must contain a description of the release, including the type of material and an estimate of the amount spilled, the date of the release, an explanation of why the spill occurred, and a description of the steps taken to prevent and control future releases. The releases would be documented on a spill report form.

Conservation Measure 12: Conduct Preconstruction Surveys and Monitoring for Giant Garter Snake

Prior to ground-disturbing activities within 200 feet of suitable habitat, a USFWS-approved biological monitor will conduct a preconstruction survey of suitable aquatic and upland habitat and inspect exclusion and orange barrier fencing to ensure they are both in good working order each morning. If any snakes are observed within the construction area at any other time during construction the USFWS-approved biological monitor will be contacted to survey the site for giant garter snakes. The biological monitor will have the authority to stop construction activities until appropriate corrective measures have been completed or it is determined that the snake will not be harmed. Giant garter snakes encountered during construction activities will be allowed to move away from construction activities on their own. If unable to move away on their own, trapped or injured giant garter snakes will be only be removed by the USFWS-approved biological monitor and will be placed in the nearest suitable habitat that is outside of the construction area. The biological monitor will immediately report these activities to USFWS by phone and will provide a written account of the details of the incident within 24 hours.

Once all initial ground-disturbing activities are completed, the biological monitor will perform weekly checks of the site for the duration of construction in order to ensure that construction barrier fences and exclusion fences are in good order, trenches are being covered, project personnel are conducting checks beneath parked vehicles prior to their movement, and that all other required biological protection measures are being complied with. The biological monitor will document the results of monitoring on construction monitoring log sheets, which will be provided to USFWS within 1 week of each monitoring visit.

Conservation Measure 13: Provide Escape Ramps or Cover Open Trenches at the End of Each Day

To avoid entrapment of giant garter snake, thereby preventing injury or mortality resulting from falling into trenches, all excavated areas more than 1 foot deep will be provided with one or more escape ramps constructed of earth fill or wooden planks at the end of each workday. If escape ramps cannot be provided, then holes or trenches will be covered with plywood or other hard material. The biological monitor or construction personnel designated by the contractor will be responsible for thoroughly inspecting trenches for the presence of giant garter snakes at the beginning of each workday. If any individuals have become trapped, the USFWS-approved biological monitor will be contacted to relocate the snake and no work will occur in that area until approved by the biologist.

Conservation Measure 14: Implement Additional Protective Measures during Work in Suitable Habitat during the Giant Garter Snake Dormant Period

USACE will implement additional protective measures during time periods when work must occur during the giant garter snake dormant period (October 2–April 30), when snakes are more vulnerable to injury and mortality. It is expected that these additional measures will be implemented during canal relocation at Reaches 22 and 28 to 29 and pipe reconstruction at Reaches 26–28 and during February–March, and if construction activities extend to the period between October 2 and November 1. A full-time USFWS-approved biological monitor will be onsite for the duration of construction activities.

- All emergent vegetation within the Sutter-Butte Canal on the levee side, and vegetation within 200 feet of the canal will be cleared prior to the giant garter snake hibernation period (i.e., vegetation clearing must be completed by October 1 for following winter work).
- Exclusion fencing will be installed around the perimeter of the work area and across the Sutter-Butte Canal where construction activities associated with levee slope flattening and pipe reconstruction activities would occur. The fencing should enclose the work area to the maximum extent possible to prevent giant garter snakes from entering the work area. Fencing will be installed during the active period for giant garter snakes (May 1–October 1) to reduce the potential for injury and mortality during fence installation. The USFWS-approved biological monitor will work with the contractor to determine where fencing should be placed and will monitor fence installation. The exclusion fencing will consist of 3 foot-tall erosion fencing buried 4-6 inches below ground level. The exclusion fencing will minimize opportunities for giant garter snake hibernation in the adjacent upland area (between canal and existing levee).

  Portions of the Sutter-Butte Canal that are temporarily disturbed during construction will be revegetated with emergent vegetation and adjacent disturbed upland habitat will be revegetated with native grasses and forbs after construction is complete.

Conservation Measure 16: Restore Temporarily Disturbed Aquatic and Upland Habitat to Pre-Project Conditions

To avoid permanent impacts, Upon completion of the construction, USACE will restore temporarily affected suitable and upland habitat for giant garter snake to pre-project conditions within a maximum of one season (a season is defined as the calendar year between May 1 and October 1 [U.S. Fish and Wildlife Service 1997]).

Conservation Measure 17: Compensate for Permanent Loss of Suitable Habitat for Giant Garter Snake

Compensation for permanent effects on giant garter snake aquatic and upland habitat will follow the guidance in the Programmatic Consultation. USACE will compensate for the permanent loss of suitable aquatic habitat and upland habitat for giant garter snake by purchasing preservation credits at a USFWS and CDFW approved conservation bank. Project impacts to GGS are discussed in Section 2.3 and compensation ratios are discussed below in Section 3.4.

2.2 Site Characteristics

2.2.1 Biological Resources in the Project Area

This section identifies the field surveys conducted to identify biological resources known to occur or having the potential to occur in the project area, special-status wildlife and fish species with potential to occur in the project area, and the effects of the project on sensitive biological resources.

Field Surveys

The field surveys conducted to identify biological resources in the project area consisted of habitat mapping, a delineation of wetlands and other waters of the U.S., special-status wildlife surveys, and a tree survey.

Land Cover Mapping

The information pertaining to land cover types in the project area was derived primarily from the collaborative mapping done in November 2010 by ICF International GIS staff and Galloway Consulting and updated as needed based on the results of the 2011 reconnaissance-level biological assessment conducted by ICF International biologists. These 2010 and 2011 field surveys were conducted by combination of aerial photograph interpretation and walking and driving through the project area.

Land cover types in the project area fall into four broad categories: wildlands, potential wetlands and other waters of the U.S., agricultural lands, and developed/disturbed areas.

Delineation of Wetlands and Other Waters of the U.S.

In June, July, and August 2012, HDR conducted a formal delineation of wetlands and other waters for all areas that may potentially be directly affected by construction of the project. Potential borrow site locations were surveyed for wetlands in winter 2012. An approved Preliminary Jurisdictional Delineation for the project area was received on May 1, 2013.

Special-Status Wildlife Surveys

Field surveys to identify habitats for special-status wildlife and elderberry shrub (*Sambucus* spp.) habitat for VELB in the project area were conducted by ICF biologists on July 20–22, July 27, and August 31, 2011. Additional mapping of the elderberry shrubs was conducted by ICF concurrently with arborist surveys in summer 2012. During the 2011 surveys, biologists located elderberry shrubs by driving and walking along the levee in the project area and mapped elderberry shrubs (and shrub clusters) with a sub-meter accuracy global positioning system (GPS). When the bases of shrubs were accessible, stem counts, heights, and widths of shrubs were recorded, and shrubs were surveyed for VELB exit holes. Where dense poison oak (*Toxicodendron diversilobum*), Himalayan blackberry (*Rubus armeniacus*), and/or other vegetation surrounds elderberry shrubs, stem counts and exit hole surveys could not be conducted. Final stem counts will be conducted on all elderberry shrubs prior to removal for transplanting.

An assessment of habitat for giant garter snake was conducted by ICF and HDR biologists on July 12, 2012, and October 25, 2012. During the assessment, biologists evaluated aquatic and upland habitat

for giant garter snake, took representative photographs of habitat present, and recorded all wildlife species observed.

Borrow sites recently have been identified and have not been surveyed yet. Surveys of these sites are planned to occur prior to construction. Any borrow site that contains habitat for listed species will not be utilized.

Tree Survey

ICF arborists assessed trees within the project footprint from July 17 to October 11, 2012. The arborist survey methods followed standard professional practices. Tree location data were collected with a GPS unit. Trees within the defined project footprint, overhanging the project footprint, and greater than 4 inches in DBH were surveyed. Trees were labeled with an aluminum tree tag with unique numbers inscribed on the tags.

The assessment criteria and recorded data from the arborist survey included:

- Identification of the species
- Status of the species
- Number of trunks
- Diameter of trunk 4.5 feet above the ground surface (DBH)
- Tree height
- Canopy dripline radius
- Health, vigor, and structure
- Remarks

For trees with relatively symmetrical canopies, the measurement from the trunk to the end of the longest lateral limb was measured and doubled to determine the diameter of the canopy. For trees with asymmetrical canopies, the diameter of the canopy was determined by adding the distance as measured from the longest lateral limb to the trunk to the distance measured from the trunk to the longest lateral limb on the opposite side of the tree (greater than 90 degrees either side from the first measurement).

Tree health and structure were rated as *good*, *fair*, or *poor*. Table 2-3 provides a general definition of these ratings. Where conditions were between ratings of good and fair or fair and poor, intermediate ratings of fair-good and fair-poor were given.

Table 2-3. Criteria Used to Rate the Health, Vigor, Structure and Form of Surveyed Trees

Rating	Tree Health and Vigor
Good	Overall appearance of the tree is exemplary of the species. No visible wounds or defects, or completely healed. Crown root area displays no signs of wood deterioration. Bark missing from less than 10% of trunk circumference. Trunk does not show any signs of wood decay, cracking, or deterioration. Foliage is exemplary of the species, no sprout growth observed, evenly distributed, and free of pests. No signs of disease symptoms or pests observed. Current annual twig growth is greater than expected for the species. Buds are normal size, viable, abundant, and uniform throughout canopy. Little to no evidence of stress or nutrient deficiency.
Fair	Overall appearance of the tree is representative of the species. Wounds actively healing, but not completely healed. Crown root area displays minor signs of wood deterioration. Bark missing from more than 10% but less than 30% of trunk circumference. Trunk does not show any signs of wood decay, cracking, or deterioration. Foliage is representative of the species, some sprout growth observed, foliage is unevenly distributed yet balanced across whole tree, or only a minor pest problem observed. Disease symptoms or pests observed create an intermittent or temporary nuisance. Current annual twig growth is as expected for the species. Buds are of normal size and viable, but are somewhat sparse or irregular throughout the canopy. Some evidence of minor stress or nutrient deficiency observed.
Poor	Overall appearance of the tree deviates from species representative. Wounds not healing vigorously or are showing signs of decay. Crown root area decayed over more than 30% of tree's cross section. Bark missing from more than 30% of trunk circumference. Trunk shows signs of wood decay, cracking, or deterioration. Foliage deviates from species representative, sprout growth observed, foliage is unevenly distributed, or pest infestation observed. Disease symptoms or pests observed threaten the health and well-being of host and/or adjacent trees. Current annual twig growth is less than expected for the species. Buds are few, or not viable, or sparse, or irregular throughout the canopy. Evidence of stress or nutrient deficiency observed.

Rating	Tree Structure and Form
Good	Tree structure has a low potential for failure. Ample space for tree to grow to mature size characteristic of the species. No visible root defects or damage from roots to infrastructure observed. No anchor roots exposed. Trunk appears solid and free of cavities, decay, or hollowness. No bark inclusion observed. Canopy is full and balanced. Single leader, branch attachment solid, and angle of branch attachment exemplary. No dead limbs observed, all limbs free of defects, and limbs are not overburdened.
Fair	Tree structure has a moderate potential for failure. Adequate space available for tree to grow to a size representative of the species. Roots abutting infrastructure, displacing built objects from normal alignment. Some anchor root exposure. Trunk displays some signs of minor deterioration, but structurally still solid and in process of healing. Bark inclusion observed only on minor branches and away from posing threats to health, safety, and welfare of the public. Canopy is slightly lacking or unbalanced. Leader not clearly defined, but not missing; branch attachment characteristic of species. One minor dead limb observed, but solidly attached, other limbs free of defects, limbs only slightly overburdened.
Poor	Tree structure has a high potential for failure. Inadequate space available for tree to grow to a size representative of the species. Roots lifting sidewalks or built objects from normal grade, extensive portions of root system cut, decay of root crown in excess of 30%, or root zone subject to overwatering. Anchor roots exposed. Trunk decay is affecting 30% or more of the trunk cross section, healing process slow or not evident, or crack observed. Unequal weight distribution within tree structure due to trunk lean. Bark inclusion at branches, involving main trunk, or posing a threat to health, safety, or welfare of the public. Canopy is lacking or unbalanced, or concentrated in the upper 1/3 of tree. Double leader or no leader observed, a branch observed nearly as large as trunk, narrow angles of branch attachment, multiple limb attachments or attachments of limbs not characteristic of species, or decay observed at branch attachment. More than one dead limb observed, a wound in limb observed greater than 30% of cross section, limbs overburdened, or multiple branches sprouting from cuts.

2.2.2 Special-Status Plants

Special-status plant species are plants that are legally protected under CESA, ESA, or other regulations, and species considered sufficiently rare by the scientific community to qualify for such listing.

Nine special-status plant species have been reported in the seven USGS quadrangles that overlap the project area (California Department of Fish and Game 2010; California Native Plant Society 2012; California Department of Fish and Game 2012; U.S. Fish and Wildlife Service 2012). Two species, slender Orcutt grass (*Orcuttia tenuis*) and Greene's tuctoria (*Tuctoria greenei*) are vernal pool species that lack potential habitat in the project area. No vernal pools were observed in the area during the 2010 and 2011 field surveys. Six species were determined to have low potential for occurrence because the potential habitat (i.e., oak woodland, ruderal areas outside the toe of the levee) constitutes a relatively small portion of the biological study area and has been lowered in quality by past and ongoing disturbance (agricultural activities, dredging). Additionally, suitable microhabitat requirements (subalkaline flats, heavy clay soils, acidic clay soils) for these species may not be met.

Sanford's arrowhead is the only special status species that could occur in jurisdictional habitat, including freshwater marshes, sloughs, canals, and other slow moving habitats. It is neither federally or state listed, but is classified as fairly endangered in California according to the California Rare Plant Rank. For the project area, it was determined to have low potential to occur along the edges of irrigation canals, inundated areas of the river's floodplain within riparian forest, and ponds on the land side of the levee that support a fringe of riparian forest.

2.2.3 Special-Status Wildlife Species

Special-status wildlife species are defined as animals that are legally protected under the ESA, CESA, or other regulations and species that are considered sufficiently rare by the scientific community to qualify for such listing. Special-status wildlife species are defined as follows.

- Species that are listed or proposed for listing as threatened or endangered under the ESA (50 CFR 17.11 for listed animals and various notices in the Federal Register (FR) for proposed species).
- Species that are candidates for possible future listing as threatened or endangered under the ESA (77 FR 69993, November 21, 2012).
- Species listed or proposed for listing by the State of California as threatened or endangered under the CESA (14 CCR 670.5).
- Species that meet the definitions of rare or endangered under CEQA (State CEQA Guidelines Section 15380).
- Animals listed as California species of special concern on CDFW's Special Animals List (California Department of Fish and Game 2011).
- Animals that are fully protected in California under the California Fish and Game Code (Sections 3511 [birds], 4700 [mammals], and 5050 [reptiles and amphibians]).

Based on the USFWS (2012) species list and CNDDB (California Department of Fish and Game 2012) records search for the quadrangles overlapping the affected area, 23 special-status wildlife species

were identified as having potential to occur in the affected area. Of these 23 species, four are known to occur in the affected area (western pond turtle, Swainson's hawk, western yellow-billed cuckoo, and bank swallow). Swainson's hawk was observed in the affected area during 2011 field surveys. Though not reported to occur in the affected area, 10 other special-status wildlife species have a moderate or high potential to occur in the affected area given their known range, reports of occurrence, and/or the presence of suitable habitat. These species include Antioch Dunes anthicid beetle (*Anthicus antiochensis*), Sacramento anthicid beetle (*A. sacramento*), Sacramento Valley tiger beetle (*Cicindela hirticollis abrupta*), VELB, giant garter snake, northern harrier, bald eagle, western burrowing owl, tricolored blackbird, and silver-haired bat. The remaining nine species have low or no potential to occur. Seven additional species were added as having at least a moderate potential to occur in the affected area based on species habitat requirements and professional judgment (white-tailed kite, loggerhead shrike, purple martin, yellow warbler, pallid bat, hoary bat, and western red bat).

ESA Consultation to Date

Of the 10 federally listed species considered for inclusion, only VELB and the giant garter snake have the potential to be affected by the project.

USACE, pursuant to ESA, must consult with USFWS with regard to any proposed actions that may affect the continued existence of a federally listed species. Following is a summary of communications with USFWS for the project.

The Corps has determined that the proposed project may affect, and is likely to adversely affect the federally-listed as threatened valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*)(beetle) and the giant garter snake (*Thamnophis gigas*)snake. A Biological Opinion (08ESMF00-2013-F-0342-1) was received from USFWS on May 2, 2013 concurring with the Corps determination and that critical habitat will not be affected concluding ESA section 7 consultation for the proposed project.

Project impacts to VELB and GGS habitat are discussed below.

Valley Elderberry Longhorn Beetle

Status and Distribution

VELB was listed by USFWS as a threatened species on August 8, 1980 (45 FR 52803–52807), due to loss of habitat and inadequate regulatory protection. The current known range of VELB extends from southern Shasta County, south to Fresno County, and from the east side of the Coast Range to the Sierra Nevada foothills (Barr 1991; U.S. Fish and Wildlife Service 2006). The USFWS promulgated the final ruling designating critical habitat for VELB on August 8, 1980 (45 Federal Register [FR] 52804). Two critical habitat areas were designated along portions of the American River in Sacramento County (the Sacramento Zone and the American River Parkway Zone). The Proposed Action addressed in this BA is not located within designated critical habitat for VELB. Critical habitat has not been designated for giant garter snake. Accordingly, critical habitat is not discussed further in this BA.

In 2006, USFWS released a 5-year review for VELB that recommended delisting the species due to reduction of its primary threats (loss of riparian and inadequacy of regulatory mechanisms) and the increased number of occurrences in the Central Valley (U.S. Fish and Wildlife Service 2006). The

report recommended a post-delisting monitoring plan that includes monitoring of the 195 known VELB locations. The purpose of the plan would be to ensure that VELB remains stable after ESA protections are removed.

On August 19, 2011, USFWS announced a 90-day finding on a petition to delist VELB (76 FR 51929–51931). USFWS found that the petition presented substantial scientific or commercial information indicating that delisting may be warranted and requested further scientific and commercial data and other information regarding VELB. Following the review of additional information, USFWS will issue a 12-month finding on the petition, which will address whether the petitioned action is warranted.

Habitat and Biology

VELB is dependent on its host plant, elderberry, which is a common component of riparian corridors and adjacent upland areas in the Central Valley. VELB has four stages of life: egg, larva, pupa, and adult. Females deposit eggs on or adjacent to the host elderberry. Egg production varies and females have been observed to lay between 16 and 180 eggs (U.S. Fish and Wildlife Service 2007). Eggs hatch within a few days of being deposited and larvae emerge. The larvae bore into the wood of the host plant and create a long feeding gallery in the pith of the elderberry stem. The larvae feed on the pith of the plant for 1–2 years. When a larva is ready to pupate, it chews an exit hole to the outside of the stem and then plugs it with frass. The larva then retreats into the feeding gallery and constructs a pupal chamber from wood and frass. The larvae metamorphose between December and April; the pupal stage lasts about a month. The adult remains in the chamber for several weeks after metamorphosis and then emerges from the chamber through the exit hole. Most records for adults show occurrence from late-April to mid-May (U.S. Fish and Wildlife Service 2007). Adults feed on elderberry leaves and mate within the elderberry canopy.

Studies conducted in the American River basin demonstrate that VELB occurs most frequently and is most abundant in significant riparian zones that are well developed. Within significant riparian zones, VELB primarily occurs within the riparian corridor but can occur infrequently in non-riparian scrub habitats adjacent to the riparian corridor. Along the American River, the beetle tends to occupy woodlands dominated by exotic trees (black locust [*Robinia psuedoacacia*]) and black walnut [*Juglans californica*]), and in mixed riparian forests. The beetle less commonly occupies annual grasslands and live oak woodlands. One study showed that the beetle preferentially occupies elderberry shrubs in wooded areas with a relatively dense canopy cover over elderberry shrubs located in open and sparsely wooded areas. Of the occupied shrubs found in wooded areas, about 50% were under a canopy cover of 25–50%, while 25% were under canopies with 50–75% cover and 25% were under canopies with 75–100% cover. The study also demonstrated that VELB appears to be capable of limited dispersal and prefers to remain within contiguous patches of high quality riparian habitat. Clusters of local aggregations of VELB along the American River Parkway were approximately 600–800 meters in diameter (Talley 2005 in Talley et al. 2006).

A variety of branch sizes are utilized for larval development and pupation, although most of those measured in Barr's study (1991) were 2–4 inches (5–10 centimeters) in diameter at the exit hole. Infrequently, smaller branches (less than 1.5 inches [3.8 centimeters] in diameter) that contained exit holes were encountered. Lang et al. (1989) found no current-year exit holes on stems smaller than 1 inch (2.5 centimeters) in diameter. Talley et al. (2007) found that exit holes most frequently occurred in stems that were 0.8–2.8 inches (2–7 centimeters) in diameter and below 3.2 feet (1 meter) (79%). Holes were also found in larger diameter stems (2.8–4.7 inches [7–12 centimeters]) (36% of occurrences) and at heights of 3.2–6.4 feet (1–2 meters) above the ground (19%).

Reasons for Decline

The primary threat to VELB has been attributed to habitat loss and degradation of the riparian forest ecosystem as a result of agricultural and urban development (Barr 1991; Barbour et al. 1993; Eng 1984; Kucera and Barrett 1995; Katibah 1984). Colonization by the Argentine ant (*Linepithema humile*) may also pose a biological threat to VELB through egg predation (Huxel 2000).

Occurrence in the Project Area

The closest VELB occurrence in the CNDDB (California Department of Fish and Game 2012) is approximately 0.5 mile from the project area. Numerous other occurrences are located within 10 miles of the project area.

Suitable habitat for VELB is located at numerous places in the project area along the levee construction footprint. There were no elderberry shrubs observed at the five borrow site locations during the wetlands delineation effort at these sites. A total of 267 shrubs/shrub clusters were mapped in the project area. Because of property inaccessibility and the high density of California grape and Himalayan blackberry along portions of the Feather River riparian corridor, stem counts and examination of shrubs for VELB exit holes could only be conducted for 73 shrubs/shrub clusters in the project area.

Effects of the Project on Valley Elderberry Longhorn Beetle

Direct effects are defined as the direct or immediate effects of a proposed action on a species or its habitat. Direct effects may result from the action and may include the effects of interrelated and interdependent actions. An *interrelated action* is an activity that is part of the proposed action and depends on the proposed action for its justification. An *interdependent action* is an activity that has no independent utility apart from the action under consultation (U.S. Fish and Wildlife Service and National Marine Fisheries Service 1998).

Indirect effects are caused by or result from the proposed action, are later in time, and are reasonably certain to occur. Indirect effects may occur outside the area directly affected by the action (U.S. Fish and Wildlife Service and National Marine Fisheries Service 1998).

Direct Effects

Permanent Loss of Elderberry Shrubs and Potential Loss of Individual VELB from Shrub Removal

Removal of habitat (elderberry) and potential injury or mortality of VELB associated with construction of the project would be considered direct effects on VELB. Trimming of elderberry branches that are 1 inch or greater in diameter could also result in injury or mortality of VELB. Because VELB larvae may feed on the roots of elderberries, disturbance of elderberry roots within the shrub dripline could also result in injury or mortality of individuals. Where root damage is expected to be extensive, elderberry shrubs would be removed. Where damage is limited (few roots affected) and roots are expected to grow back, impacts would be considered temporary. Because incidental take of VELB would be difficult to detect or quantify, effects on elderberry shrubs will be used as a proxy for measuring take.

Elderberry shrubs within the construction area that cannot be protected will be removed in accordance with to USFWS-approved procedures outlined in the Conservation Guidelines (U.S. Fish and Wildlife Service 1999a). Shrubs will be transplanted to the Star Bend Conservation Area.

Transplanted shrubs will be moved prior to construction when the plants are dormant, approximately November through the first 2 weeks in February, after they lose their leaves. Transplanting during the dormant period will reduce shock to the plant and increase transplantation success. However, transplanted elderberry shrubs may experience stress, a decline in health, or death due to changes in soil, hydrology, microclimate, or associated vegetation.

Elderberry shrubs that can be avoided at the dripline of the shrub or greater distance will be protected with fencing and/or k-rail as described in Conservation Measure 2. Based on the location of shrubs in the project footprint, there is anticipated to be 162 elderberry shrubs that will require transplantation during construction of the project.

As described in Conservation Measure 3, surveys of elderberry shrubs to be transplanted will be conducted by a qualified biologist prior to transplantation. The data collected during the surveys prior to transplantation will be used to determine if compensation requirements are being met, or if additional plantings are necessary. Because the project would be constructed in six separate contracts, elderberry survey data for each contract will be used to rectify any discrepancies in compensation for the previous contract, and ensure that impacts are being fully mitigated. Compensation ratios for VELB habitat is discussed below in Section 3.4.

Indirect Effects

As discussed above, *indirect effects* are caused by or result from the project, are later in time, and are reasonably certain to occur. Indirect effects may occur outside the area directly affected by the action.

Loss of Connectivity to Adjacent Habitat

Loss of connectivity between elderberry shrubs may result when elderberries or associated vegetation is removed. Removal of such vegetation could result in gaps in vegetation that are too wide for VELB to travel across due to their fairly limited movement distances (Talley et al. 2006a), resulting in separation of individuals or reducing the possibility of colonization of adjacent areas. Removal of associated vegetation may result in an altered habitat structure or microclimate that could affect behaviors of VELB in response to these changes in unforeseen ways (U.S. Fish and Wildlife Service 2003).

Although more research is needed, VELB has been observed to fly a mile or more in contiguous or fairly contiguous habitat, and exit holes have been observed on isolated shrubs that are a minimum of 0.25 mile (0.4 kilometer) from the next nearest elderberry (Arnold pers. comm. 2011). Within the American River Basin, evidence suggests that local beetle movements are farther within the riparian corridor (141±144 feet [43±44 meters]) than in the adjacent non-riparian scrub (82±52 feet [25±16 meters]) (average±1 standard deviation nearest neighbor distances between recent exit holes) illustrating that VELB population extents may also be habitat-specific (Talley et al. 2006a).

Soil Disturbance Adjacent to Roots

Ground disturbance within 20 feet (6.1 meters) of an elderberry shrub's dripline could result in disturbance of roots. Root damage could result in stress or reduced vigor of elderberry shrubs. Because construction of the project may result in disturbance within 20 feet (6.1 meters) of the dripline of elderberry shrubs, indirect effects on these shrubs may result. Elderberry shrubs will be fenced and/or protected with k-rail, as described in Conservation Measure 2, to minimize soil disturbance adjacent to roots. With this measure in place, and because elderberry shrubs are hearty

and frequently re-sprout after damage, this indirect effect is not expected to substantially affect VELB.

Dust

Vehicle travel on the levee road adjacent to elderberry shrubs during construction of the project could result in dust becoming airborne and settling on elderberries. The levee road is graveled, and existing shrubs are and have been exposed to dust from vehicles associated with farming and levee maintenance. Construction of the project would increase the amount of dust in the project area as a result of ground-disturbing activities and an increase in the frequency of vehicles driving on the levee road. The amount of dust in the project area would be minimized through dust control measures, as described in Conservation Measure 4. Additionally, according to Talley et al. (2006b), in an experiment along the American River Parkway (Sacramento County) conditions of elderberry shrubs related to dust from nearby trails and roads (paved and dirt) did not affect the presence of VELB. Additional work by Talley and Holyoak (2009) found no effect on elderberries from dust accumulations. Because dust has not been found to greatly affect elderberry shrubs and because dust control measures would be implemented during construction, this indirect effect is not expected to substantially affect VELB.

Altered Hydrology

Reduction of water to elderberry shrubs as a result of altered hydrology from changes in topography or compaction of soil could result in reduced shrub vigor/vitality and an associated decrease in shoot, leaf, and flower production and ultimately reduce the suitability of the shrubs to provide habitat for VELB. In most portions of the project area, the levee will be degraded and re-built within the same footprint, and would not modify the hydrology of the surrounding area where elderberries may be present. There may be a few instances where the slope is modified or there are other changes that may affect the hydrology in the project area. These situations are expected to be rare. Additionally, a substantial portion of the elderberries are located within riparian woodland along the Feather River and obtain water from within the river channel, which will not be hydrologically changed as a result of the project. Therefore, altered hydrology as a result of the project is not expected to substantially affect VELB.

Existing Elderberry Shrubs in the Conservation Area

As described in Conservation Measure 5, elderberry shrubs to be removed will be transplanted to the Star Bend Conservation Area, which contains existing elderberry shrubs. Although transplantation activities may occur within 100 feet of existing elderberry shrubs, it is unlikely that they would be indirectly affected by transplantation activities, as the transplantations would be conducted by qualified individuals who would be knowledgeable about elderberry shrubs and the existing conditions within the conservation area.

Temporal Loss of Habitat

It generally takes 5 or more years for newly planted elderberry cuttings/seedlings to become large enough to support beetles, and it generally takes 25 years or longer for riparian habitats to reach their full value (U.S. Fish and Wildlife Service 1994). Because elderberry shrubs within the project area will be transplanted to the Star Bend Conservation Area, which is immediately adjacent to the project area, no temporal loss of habitat for VELB is expected. Additional elderberry plantings in the conservation area will provide additional and/or replacement habitat for VELB in future years.

Giant Garter Snake

Status and Distribution

Giant garter snake was listed as a threatened species by USFWS on October 20, 1993 (58 FR 54033). The species is also State-listed as threatened. Giant garter snake is endemic to the Sacramento and San Joaquin Valleys where it is found in lowland areas (U.S. Fish and Wildlife Service 1999b). Historically, this species was found throughout the Central Valley from Butte County in the north to Kern County in the south. Currently, giant garter snake is only known to occur in 13 discrete populations in the Sacramento and San Joaquin Valleys in Butte, Colusa, Fresno, Glenn, Merced, Sacramento, San Joaquin, Solano, Stanislaus, Sutter, and Yolo Counties (U.S. Fish and Wildlife Service 1999b:9, 11–12).

Habitat and Ecology

Giant garter snakes inhabit agricultural wetlands and other waterways including irrigation and drainage canals, ricelands, marshes, sloughs, ponds, small lakes, and low gradient streams, as well as adjacent upland areas in the Central Valley. Because of the direct loss of natural habitat, giant garter snake relies heavily on rice fields in the Sacramento Valley, but it also uses managed marsh areas in national wildlife refuges and State wildlife areas.

Habitat requirements for giant garter snake consist of the following.

- Adequate water during the snake's active season (early spring through mid-fall) to provide food and cover.
- Emergent, herbaceous wetland vegetation, such as cattails and bulrushes, for escape cover and foraging habitat during the active season.
- Grassy banks and openings in waterside vegetation for basking.
- Higher elevation uplands for cover and refuge from flood waters during the snake's dormant season in the winter.

Giant garter snake can persist in waterbodies that contain predatory fish if sufficient cover is present. It is typically absent from larger rivers because of lack of suitable habitat and emergent vegetative cover; it is also typically absent from wetlands with sand, gravel, or rock substrates. Riparian woodlands typically do not provide suitable habitat because of excessive shade, lack of basking sites, and absence of prey populations.

Giant garter snake inhabits small mammal burrows and other soil crevices above prevailing flood elevations throughout its winter dormancy period (November through mid-March), where it typically selects burrows with sunny exposure along south and west facing slopes. The breeding season extends from March through May and resumes briefly in September. Females give birth to live young from late July through early September. Giant garter snake feeds primarily on small fishes, tadpoles, and frogs (U.S. Fish and Wildlife Service 1999b:12, 13, 22, 24).

Reasons for Decline

Giant garter snake has been extirpated from the southern third of its range as a result of agricultural and flood control activities, which have eliminated the snake's freshwater marsh habitat in the historical Buena Vista, Tulare, and Kern lakebeds. Much of the habitat on the floor of the Central

Valley has been lost or degraded by upstream watershed modifications, water storage and diversion projects, and urban and agricultural development. Other negative factors that may be contributing to the decline of giant garter snakes include interrupted water supply, poor water quality, and contaminants (U.S. Fish and Wildlife Service 1999b:25.)

Occurrence in the Project Area

There are no CNDDB records of occurrences of giant garter snake in the project area; however, there are 20 records of occurrences within 5 miles of the project area (California Department of Fish and Game 2012). The information for some of these records is suppressed, but the closest available occurrence is approximately 2 miles from the project area (California Department of Fish and Game 2012).

Within the project area, suitable aquatic habitat for giant garter snake is present within rice fields, irrigation canals, drainage canals, and ponds. Some of the drainage canals and ponds in the project area provide suitable aquatic habitat but do not have connectivity to other water features except the Feather River (which is not considered suitable habitat).

Canals

Canals in the project area consist of the Sutter-Butte Canal and other linear, concrete-lined features that convey water across multiple parcels. Many of these features have no vegetation present, while some have herbaceous emergent (rooted) vegetation and shrubs present in the margins. These canals generally convey water only during the active agricultural periods, which take place between April 15 and February 15.

Suitable upland habitat in the project area is limited to the levee banks and adjacent ruderal areas. Giant garter snakes (if present) are expected primarily to be associated with aquatic habitat in the project area. Table 2-5 provides a summary of the suitability of potential aquatic habitat in the levee construction portion of the project area. Table 2-6 provides a summary of the suitability of potential borrow sites to provide habitat for giant garter snake.

Table 2-5. Suitability of Aquatic Habitat for Giant Garter Snake in the Levee Construction Portion of the Project Area

Approximate Stationing	Aquatic Habitat	Suitability for Giant Garter Snake
208	Perennial ponded area, ditch along levee toe	Suitable aquatic—limited upland, no connectivity to other aquatic.
233	Ditch on land side of levee	Suitable aquatic.
254–258	Pond	Suitable aquatic—limited upland, no connectivity to other aquatic.
280	Canal	Suitable aquatic (low quality) —limited upland, has connectivity to other canals/ditches.
292	Concrete lined canal	Suitable—isolated segment but near other canals.
310	Perennial pond	Suitable aquatic—burrows in grassy hillside and levee side, channel from pond continues north along base of levee and also provides habitat.
336	Perennial pond	Dense willow ring, limited basking areas and upland, limited suitability/low potential for species.

Approximate Stationing	Aquatic Habitat	Suitability for Giant Garter Snake
373	Open channel on water side of levee	Suitable aquatic.
396	Canal	Suitable aquatic.
409–410	Cement-lined storage pond	Not suitable—concrete-lined and fenced.
409–410	River backwater, freshwater emergent, and seasonal wetland	Marginal aquatic—area connected to river with marsh.
426	Channel with marsh (seasonal wetlands)	Suitable aquatic—open areas for basking, side of levee may provide upland.
434	Perennial pond	Suitable aquatic—open areas for basking, side of levee provides upland habitat.
512	Canal	Not suitable—canal is concrete-lined, used for drainage, and not connected to other canals/ditches and water not maintained.
544–577	Abbott Lake	Suitable aquatic—open areas for basking, limited upland habitat, connected "channel" along base of levee to the north also provides suitable aquatic.
647–649	Cement-lined storage pond	Not suitable.
689	Canal	Assumed suitable—appears to connect to other canals/ditches, limited suitable upland.
872–880	Seasonal wetland	Wetland feature observed dry during October 25, 2012 site visit. Not suitable—likely does not stay inundated through summer, may not have open water.
1043–1052	Detention pond	Not suitable—unvegetated and unlikely to sustain water through summer.
1043	Stream	Not suitable—stream isolated by river and development.
1060	Stream	Not suitable—stream isolated by river and development.
1375	Unlined canal	Suitable habitat—water present throughout the summer.
1428	Start of Sutter-Butte Canal	Suitable throughout the project area—water year-round, some patches of suitable emergent vegetation, connectivity to other canals/ditches.
1707	Canal	Similar to the Sutter-Butte Canal, suitable aquatic—connectivity to other canals/ditches.
1761–1766	Ditch	Not suitable—ditch is not very defined and is isolated.
1902	Ditch	Suitable aquatic—ditch had water on October 25, 2012 site visit, ditch is small and isolated but is in close proximity to the Sutter-Butte Canal.
1958	Canal/ditch	Assumed suitable—connected to Sutter-Butte Canal.
2076, 2122, 2217, 2262	Ponds in tailings area	Marginal suitability—aquatic areas appear suitable at base, but are often surrounded by steep mounds of tailings; availability of food is questionable; upland areas are rocky and are unlikely to provide burrows.
2359	Canal	Assumed suitable—it connects to other canals and ditches, although canal has stagnant water and really steep sides.

Table 2-6. Habitat Suitability of Potential Borrow Sites for Giant Garter Snake

Potential Borrow Site	Habitat Present	Habitat Suitability
Oroville Wildlife Area Dredge Tailings Area	Tailings with emergent vegetation	Not considered suitable—aquatic areas appear suitable at base, but are often surrounded by steep mounds of tailings; availability of food is questionable; upland areas are rocky and are unlikely to provide burrows.
City of Live Oak Detention Basin	Irrigation ditch and grassland	Suitable—irrigation ditch along the edge of the property extends beyond the potential borrow site and provides suitable aquatic habitat; adjacent grassland provides suitable upland habitat.
South Ella Detention Pond	Ruderal grassland	Not suitable—no reported aquatic habitat within 200 feet of potential detention pond borrow site.
Lanza 40-acre property	Agricultural/ row crops	Suitable—irrigation ditch along the edge of the property provides suitable aquatic habitat but adjacent area where borrow would be removed is not suitable (i.e., no impacts to irrigation ditch).
Marler property	Agricultural/ row crops	Not suitable—no aquatic or upland habitat present.

Effects of the Project on Giant Garter Snake

Suitable aquatic habitat for giant garter snake in the project area consists of rice fields, irrigation canals, drainage canals, and ponds. Suitable upland habitat consists of ruderal grassland on the levee banks and adjacent to the levee banks. For the effects discussion below, impacts on ruderal grassland areas were calculated if they occur within 200 feet of suitable aquatic habitat.

Permanent and Temporary Disturbance of Suitable Aquatic and Upland Habitat for Giant Garter Snake

Permanent and temporary losses of suitable aquatic and upland habitat for giant garter snake within the project area are summarized in Table 2-7. Construction of SB-8 would result in the permanent loss of 3.54 acres of suitable upland habitat for giant garter snake. The permanent loss results from the installation of 3,700 linear feet of landside levee slope erosion protection (anchored high performance turf reinforced mat). Construction of SB-8 would also result in the temporary loss or disturbance of 118.80 acres of suitable upland habitat for giant garter snake. Temporary impacts to suitable upland habitat would mostly occur along the levee and at the City of Live Oak Detention Basin borrow site.

Permanently impacted suitable upland and aquatic habitat for giant garter snake would be compensated for through purchasing preservation credits equal to 22.5 acres of giant garter snake habitat at Westervelt Ecological Services' Sutter Basin Conservation Bank in Sutter County, as described in Conservation Measure 17.

Temporarily affected aquatic and upland habitat would be restored to pre-project conditions within a maximum of one season (a season is defined as the calendar year between May 1 and October 1 [U.S. Fish and Wildlife Service 1997]), as described in Conservation Measure 16.

If additional impacts to giant garter snake habitat are expected to occur within or outside of the project area, USACE will consult with USFWS to determine whether reinitiation of Section 7 consultation is necessary to address these additional effects.

Disturbance or degradation of suitable aquatic habitat for giant garter snake in the project area could occur if soil or other materials are sidecast or fall into the habitat. Fuel or oil leaks or spills adjacent to aquatic habitat could also cause degradation of habitat. These potential effects would be avoided by installing sediment and construction barrier fencing (Conservation Measure 7), locating staging areas away from aquatic habitat (Conservation Measure 8), implementing sediment and contaminant BMPs as required by the NPDES permit (SWPPP) (Conservation Measure 9), and preparing a frac-out plan and SPCCP (Conservation Measures 10 and 11).

Table 2-7. Effects on Giant Garter Snake Habitat in the project area

Habitat	SB8 Levee Construction Area	Borrow Sites in Acres	SB8 Total Acreage
Temporary Effects			
Aquatic habitat	11.9	127.72	139.62
Upland habitat (ruderal within 200 feet of aquatic habitat)	96.79	175.47	272.26
Permanent Effects			
Aquatic habitat	0	0	0
Upland habitat (ruderal within 200 feet of aquatic habitat)	3.54	0	3.54

Potential Injury or Mortality of Giant Garter Snake

Construction activities in suitable habitat could result in the injury, mortality, or disturbance of giant garter snakes. Giant garter snakes could be injured or crushed by construction equipment working in suitable aquatic and upland habitat, or if soil or other materials are side-cast or fall into suitable aquatic habitat. Snakes could also be killed by construction vehicles traveling though the project area. Fuel or oil spills from construction equipment into aquatic habitat could also cause illness or mortality of giant garter snakes. Trenches left open overnight could trap snakes moving through the construction area during the early morning hours. Noise and vibrations from construction equipment, and presence of human activity during construction activities may also disturb giant garter snakes within the project area.

Most construction activities will be limited to the snake's active period (May 1–October 1) when the potential for direct mortality is reduced because snakes can actively move and avoid danger. However, realignment work for the Sutter-Butte Canal (Reaches 22, 28-29) requires construction during February and March when the irrigation canal is dry. Giant garter snakes, if present, in the upland ruderal grassland adjacent to the canal could be injured or killed during work within the snake's dormant period. Conservation Measure 14 would be implemented to reduce the potential for mortality.

Potential effects on giant garter snake would be minimized or avoided by conducting biological resources awareness training (Conservation Measure 1), conducting work during the active period (May 1–October 1) (Conservation Measure 6), installing exclusion fencing around suitable habitat (Conservation Measure 7), conducting preconstruction surveys and monitoring (Conservation

Measure 12), and providing escape routes or covering open trenches (Conservation Measure 13). If work continues past October 1, additional preconstruction surveys and monitoring will be required (Conservation Measure 14).

Indirect Effects

Construction of the project is not expected to have any indirect effects on giant garter snake. Two potential indirect effects on giant garter snake and its habitat were considered but were determined to have no potential to occur as a result of the project. Specifically, the following determinations were made.

- There would be no increase of trash, hazardous waste, or off-road vehicle use due to increased human presence. The project would not result in development or increased access to giant garter snake habitat.
- The project would not result in indirect effects on habitat suitability through changes in the length of inundation or other habitat modifications that would make the habitat less suitable for giant garter snake.

Cumulative Effects

As described above, cumulative effects are future State, local, and private actions not involving a Federal action that are reasonably certain to occur within the action area under consideration. No other actions within the action area are proposed at this time. Therefore, no cumulative effects would result from the proposed action.

Future Federal actions that are unrelated to the project are not considered in this section because they would be subject to separate consultation pursuant to Section 7 of the ESA.

2.2.4 Special-Status Fish Species

Several special-status fish species occur or have the potential to occur in or near the study area. Critical habitat for spring-run Chinook salmon and Central Valley steelhead falls within the study area in the Feather River. In addition, the Feather River is designated critical habitat for green sturgeon (74 FR 52345 October 9, 2009). While the Feather River is not designated critical habitat for winter-run Chinook salmon, effects on this species were considered as they have the potential to occur in the study area for at least part of their life-cycle.

No construction activities are proposed in-river or below ordinary high water mark (OHWM); all activities that would result in physical disturbance and removal of vegetation on the waterside slope of the levee would be limited to areas above OHWM. Therefore, no physical modification of critical habitat for ESA-listed fish species would be expected because all proposed construction activities would occur above the OHWM of the Feather River. No mitigation measures are required for special-status fish due to project impacts. Loss of waterside riparian habitat that may indirectly affect fish habitat is being compensated for as described below.

2.2.5 Riparian Forest

Riparian forest occurs along the Feather River, on the waterside and landside of the levees, and forms a fringe around ponds. Riparian forests support an overstory dominated by mature native and nonnative trees. The dominant overstory species are valley oak (*Quercus lobata*), Fremont

cottonwood (*Populus fremontii* ssp. *fremontii*), or Goodding's black willow (*Salix gooddingii*). Other trees commonly observed in the riparian forest are box elder (*Acer negundo* var. *californicum*), arroyo willow (*S. lasiolepis*), Oregon ash (*Fraxinus latifolia*), and western sycamore (*Platanus racemosa*). The shrub layer of most of the riparian forest in the biological study area is extremely dense, and species commonly observed are Himalayan blackberry, poison oak, button bush (*Cephalanthus occidentalis*), wild rose (*Rosa* spp.) and blue elderberry (*Sambucus nigra* ssp. *caerulea*). Blue elderberry is the host plant for the valley elderberry longhorn beetle, federally listed as threatened. Many of the trees and shrubs in the riparian forest are covered in California grape (*Vitis californica*). The herbaceous understory of riparian forest contains a mixture of native and introduced species. Representative species observed were horsetails (*Equisetum* spp.), mugwort (*Artemisia douglasiania*), and curly dock (*Rumex crispus*). Several patches of the invasive giant reed (*Arundo donax*) occur along the edges of riparian areas.

Effects of the Project on Riparian Forest

An arborist survey of the project area was conducted during the summer of 2012 to identify riparian trees that would be affected by the project. Cutoff wall and seepage berm construction would require removal of vegetation within the construction footprint. An additional amount of riparian habitat located in the ETL vegetation-free zone could require removal to comply with USACE levee vegetation policy. A variance under the policy would reduce this loss.

Construction of the project is estimated to impact 42.50 acres of riparian forest and scrub shrub riparian habitat (USFWS Draft Coordination Act Report). Tree survey dripline canopy data indicates that this impact acreage provides in total 2.88 acres of riparian tree canopy. Impacts to riparian trees were generated from data collected during the arborist survey described above in Section 2.3.1.

Vegetation removed would not be restored onsite because riparian restoration would not be permitted on the levees or seepage berms as it would conflict with USACE levee vegetation policy. The policy requires that the crown, slopes, and areas within 15 feet of the waterside and landside levee toes be maintained free of all woody vegetation.

Riparian communities, including cottonwood riparian woodland and valley oak riparian woodland, are considered sensitive natural communities by the CNDDB (California Department of Fish and Game 2012). These woodlands would be regulated by CDFW and USFWS (46 FR 7644) under no-net-loss policies for existing riparian habitat values.

2.2.6 Oak Woodland

The biological study area contains several small patches of oak woodland. The overstory of oak woodlands is predominantly valley oak but some ornamental tree species are also present. The understory of oak woodland contains annual grasses mixed with native and nonnative forbs. Representative understory species are wild oat (*Avena* spp.), soft chess (*Bromus hordeaceus*), ripgut brome (*B. diandrus*), field hedge parsley (*Torilis arvensis*), and the invasive yellow starthistle (*Centaurea solstitialis*).

Construction of the project is estimated to impact 1.30 acres of oak woodland (USFWS Draft Coordination Act Report). Tree survey dripline canopy data indicates a loss of oak trees totaling 10.12 acres of non-riparian native tree canopy. Impacts to non-riparian native trees were generated from data collected during the arborist survey described above in Section 2.3.1.

2.2.7 USACE Section 404 Jurisdictional Areas

The project area contains numerous features that are potential wetlands and other (i.e., non-wetland) waters of the United States that may be subject to USACE jurisdiction under Section 404 of the Clean Water Act (CWA). An approved Preliminary Jurisdictional Delineation for project site was received on May 1, 2013 from the USACE Sacramento District.

Affected Wetland and Other Water Types

The types and acreages of wetlands and other waters that would be affected by the proposed project are listed below in Table 2-8. A description of each type of affected wetland and other water is provided below.

Table 2-8. Acreages of Affected Wetlands and Other Waters

Land Cover Types	SB8 Alternative - Permanent	SB8 Alternative - Temporary
Irrigation/canal ditch	4.19	3.08
Riparian forest wetland	0.005	0.324
Forested Wetland	0.002	0
Drainage Fixture	0.006	0.008
Tailings wetland	0.911	0.11
Seasonal wetlands	0.026	0
Open water	0.038	0
Subtotal	***5.178***	***3.099***

Irrigation Ditches/Canals

The drainage ditches and canals scattered within the biological study area are anthropogenic features that drain water from active agricultural lands during the growing season or following a rain event. They consist of the Sutter-Butte Canal, and other linear, concrete-lined features that convey water across multiple parcels. Many of these features are unvegetated; however, some support emergent vegetation or shrubs along their margins.

Open Water

In addition to providing habitat for fish, open water provides foraging, cover, and reproductive sites for a variety of wildlife species. Open water areas provide essential foraging habitat for a variety of birds, including wading birds such as great blue heron, great egret, and snowy egret (*Egretta thula*); waterfowl such as northern shoveler (*Anas clypeata*), northern pintail (*Anas acuta*), common goldeneye (*Bucephala clangula*), mallard (*Anas platyrhynchos*), common merganser (*Mergus merganser*), ruddy duck (*Oxyura jamaicensis*), gadwall (*Anas strepera*), and cinnamon teal (*Anas cyanoptera*); other water birds such as eared grebe (*Podiceps nigricollis*), double-crested cormorant (*Phalacrocorax auritus*), and American white pelicans (*Pelecanus erythrorhynchos*); and land birds such as bald eagle (*Haliaeetus leucocephalus*), bank swallow (*Riparia riparia*), and belted kingfisher (*Megaceryle alcyon*).

Reptiles and amphibians, including western pond turtle, common garter snake, western aquatic garter snakes (*Thamnophis couchii*), Pacific tree frog, western toad, and bullfrog, use open water

areas for breeding, foraging, and cover. Canals and ditches that contain water through mid-fall, have suitable prey, and adequate cover and foraging habitat have the potential to support giant garter snake (*Thamnophis gigas*).

Mammals that use open water habitats for foraging include bats such as California myotis, Yuma myotis, hoary bat, and western red bat, which forage for insects over open water. Additionally, terrestrial mammals such as black-tailed deer, raccoon, striped skunk, and Virginia opossum use open water habitats as water sources. Aquatic and semi-aquatic mammals that occur in open water habitats include beaver, river otter (*Lutra canadensis*), mink (*Mustela vison*), and muskrat.

Riparian Forest Wetlands

Forested/shrub wetlands occur on the waterside of the levee along the margins of the Feather River (but are outside the OHWM of the river) and are concentrated in the southern half of the biological study area. The vegetation in riparian forest wetlands is comparable to that of non-wetland riparian forest and non-wetland riparian scrub-shrub (described above); however, the forested/shrub wetlands exhibit positive indicators of all three Federal wetland criteria.

Tailing Ponds

Tailing ponds are concentrated in the northern portion of the project area. As indicated, these waterbodies formed in the tailings from dredge mining and are ringed by trees and shrubs. Similar to freshwater emergent wetlands, tailing ponds with standing water typically contain a mixture of floating and emergent wetland vegetation such as common rush, tall flatsedge, lady's thumb, spikerush (*Eleocharis* spp.) floating primrose willow, and common duckweed. The adjacent trees and shrubs are Pacific willow (*Salix lasiandra*), Goodding's black willow, and valley oak.

Seasonal Wetlands

Seasonal wetlands are scattered throughout the southern half of the project area. The vegetation in seasonal wetlands is dominated by herbaceous species such as tall flatsedge, ripgut brome, Hooker's evening primrose (*Oenothera elata*), horseweed (*Conyza canadensis*), common rush (*Juncus effusus*), seashore vervain (*Verbena litoralis*), and Bermuda grass (*Cynodon dactylon*). Based on the lack of a restrictive layer and absence of a plant community with species that are typically found only in vernal pools (e.g., coyote thistle [*Eryngium* sp.]), the seasonal wetlands in the project area were determined to not be vernal pools.

Soils and Substrate

The Natural Resources Conservation Service (NRCS) Soil Survey shows the permanent impacts to jurisdictional waters are mapped within 10 different soil types. Descriptions of the soil types are listed in Table 2-9. Most of the soils have loamy alluvium parent materials, except for the 118 Xerorthents, which are dredge spoils. The soils are found on low slope floodplain and terrace landorms and range from somewhat poorly drained to somewhat excessively drained.

Hydric soils are formed under saturated conditions (due to flooding or ponding) for sufficiently long enough duration during the growing season to form anaerobic conditions in the upper soil layer. The soils support growth of hydrophytic vegetation. The 7 soils with a hydric rating and criteria are also indicated in Table 2-. Five of 7 hydric soils listed are described by the NRCS as only containing minor hydric soil components located in only 3–5% of the soil mapping unit, which means that the soils in the impacted areas themselves may not contain any hydric soil layers.

The predominant soil types of the permanently impacted jurisdictional areas (excluding canals) are 118 Xerorthents, tailings, 0 to 50 percent slopes (45% of area) and 124 Conejo loam, 0 to 2 percent slopes (29% of area). Soil type 118 Xerorthents, tailings is derived from dredged spoil piles from gravelly alluvium derived from igneous, metamorphic and sedimentary rock. The texture of the surface layer is very gravelly sandy loam. It is rated as a hydric soil across 80% of its mapping unit with a hydric rating of 4, which refers to soils that are frequently flooded for long or very long duration during the growing season. Soil type 124 Conejo loam, 0 to 2 percent slopes is derived from loamy alluvium derived from mixed sources. Typically, the surface layer is an approximate 7 inch brown loam and the subsoil is brown loam about 23 inches thick. It is not rated as a hydric soil. The third soil type comprising a substantial portion (17%) of the total impacted area is 121 Boga-Loemstone complex, 0 to 1 percent slopes. It's derived from loamy alluvium over dense silty alluvium derived from igneous and metamorphic rock. The surface layer texture is loam and it is not rated as a hydric soil.

Vegetation

The dominant plant communities in the impacted areas are described above in Section 2.3.3.

Threatened and Endangered Species

Discussion of federally–listed and other special status species is described in detail above in Section 2.3.2 and 2.3.3.

VELB was listed by USFWS as a threatened species on August 8, 1980 (45 FR 52803–52807), due to loss of habitat and inadequate regulatory protection (U.S. Fish and Wildlife Service 2011). The current known range of VELB extends from southern Shasta County, south to Fresno County, and from the east side of the Coast Range to the Sierra Nevada foothills (Barr 1991; U.S. Fish and Wildlife Service 2006). Two critical habitat areas have been designated along portions of the American River in Sacramento County (U.S. Fish and Wildlife Service 1984).

The giant garter snake is the only federally listed species occurring in jurisdictional waters requiring ESA consultation. Critical habitat has not been designated for the giant garter snake.

Table 2-9. Characteristics of Soils in the Impacted Areas

Soil Unit	Parent Material	Slope	Drainage Class	Capacity of Limiting Layer to Transmit Water	Landform	Hydric Rating	Hydric Criteria
Sutter County							
124 Conejo loam, 0 to 2 percent slopes	Loamy alluvium derived from mixed sources	0–2%	Well drained	Moderately high or high (0.57–1.98 in/hr)	Terraces		
126 Conejo-Tisdale complex, 0 to 2 percent slopes	Loamy alluvium derived from mixed sources	0–2%	Well Drained	Moderately High (0.2–0.57 in/hr)	Terraces	Yes [a]	2B3, 4
138 Liveoak sandy clay loam, 0 to 2 percent slopes	Loamy alluvium derived from igneous and metamorphic rock	0–2%	Moderately well drained	Moderately high or high (0.57–1.98 in/hr)	Terraces		
143 Marcum-Gridley clay loams, 0 to 1 percent slopes	Loamy alluvium derived from mixed sources	0–1%	Moderately well drained	Very low (0.00–0.00 in/hr)	Terraces	Yes [b]	2B3, 4
165 Shanghai silt loam, frequently flooded, 0 to 2 percent slopes	Alluvium derived from mixed sources	0–2%	Somewhat poorly drained	Moderately high or high (0.57–1.98 in/hr)	Floodplains	Yes	4
Butte County							
118 Xerorthents, tailings, 0 to 50 percent slopes	Dredged spoil piles from gravelly alluvium derived from igneous, metamorphic and sedimentary rock	0–50%	Somewhat Excessively Drained	High (1.98–4.25 in/hr)	Floodplains	Yes	4
121 Boga-Loemstone complex, 0 to 1 percent slopes	Loamy alluvium over dense silty alluvium derived from igneous and metamorphic rock	0–1%	Moderately well drained	Low to moderately low (0.00–0.06 in/hr)	Terraces		
152 Gianella fine sandy loam, 0 to 1 percent slopes, frequently flooded	Stratified coarse-loamy alluvium derived from igneous, metamorphic and sedimentary rock	0–1%	Moderately well drained	Moderately high or high (1.13–5.38 in/hr)	Floodplains	Yes [c]	4
161 Gianella fine sandy loam, 0 to 1 percent slopes, rarely flooded	Stratified coarse-loamy alluvium derived from igneous, metamorphic and sedimentary rock	0–1%	Moderately well drained	Moderately high or high (1.13–5.95 in/hr)	Floodplains	Yes [d]	2B2
162 Gianella loam, 0 to 1 percent slopes, rarely flooded	Stratified coarse-loamy alluvium derived from igneous, metamorphic and sedimentary rock	0–1%	Moderately well drained	Moderately high or high (0.85–1.98 in/hr)	Floodplains	Yes [e]	2B2

[a] Only for the Oswald component, which comprises 3% of the soil mapping unit.
[b] Only for the Oswald and Capay components, which comprise a combined 4% of the soil mapping unit.
[c] Only for the Columbia, frequently flooded component, which comprises 3% of the soil mapping unit.
[d] Only for the Columbia taxadjunct, very fine sandy loam component, which comprises 3% of the soil mapping unit.
[e] Only for the Columbia taxadjunct, very fine sandy loam component, which comprises 5% of the soil mapping unit.

2B2 - A water table at a depth of 0.5 foot or less during the growing season if permeability is equal to or greater than 6.0 in/hr in all layers within a depth of 20 inches
2B3 - A water table at a depth of 1.0 foot or less during the growing season if permeability is less than 6.0 in/hr in any layer within a depth of 20 inches.
4 - Soils that are frequently flooded for long or very long duration during the growing season.

Chapter 3
Mitigation Design

3.1 Basis for Design

On-site replacement habitat involves replacement of affected habitat with new habitat of the same type and at the same location as the loss. Because much of the affected habitat (specifically, woody vegetation) is not compliant in its location with USACE levee vegetation policy, this option is not considered feasible. Further, the highly dispersed nature of the impact locations makes efficient replacement infeasible. Therefore, on-site replacement was not considered further as a viable option for this project and off-site, in-kind habitat replacement was selected as the best option for mitigation. It involves replacement of affected habitat with the same type of habitat at a different location off-site. This often allows for consolidation of mitigation at a single or small number of sites, allowing for economy of scale and higher quality habitat due to large patch size.

The project will utilize two sub-types of off-site, in-kind replacement:

- **Permittee-responsible mitigation.** This option involves replacement of in-kind habitat on habitat lands operated by the permittee. Two separate sites are proposed for this mitigation option. The first site is the Star Bend Conservation Area (SBCA) on the west levee of the Feather River near river mile 18 is an existing floodplain habitat restoration site that was created as part of the Star Bend setback levee project. The second site is the proposed 500-acre Three Rivers Levee Improvement Authority (TRLIA) Feather River Floodway Corridor Restoration Project (FRFCRP) located on the east bank of the Feather River just upstream of the Star Bend site. Together, both sites contain sufficient area to accommodate all of the project's upland compensatory mitigation and will be used for mitigating impacts to: 1) riparian forest; 2) oak woodland; and 3) VELB.
- **Purchase of credits at commercial mitigation banks.** This option involves replacement of in-kind habitat through purchase of credits issued for habitat lands operated by a commercial mitigation bank. For the aquatic habitat impacts to GGS, the project proposes to purchase credits at the Sutter Basin Conservation Bank, operated by Westervelt Ecological Services in Sutter County, which is the only bank that presently offers giant garter snake credits approved by both the USFWS and CDFW. The project proposes to purchase jurisdictional water credits at the River Ranch Wetland Mitigation Bank, owned and operated by Wildlands, Inc., and located at the confluence of the Sacramento and Feather Rivers in Yolo County. There are currently no mitigation banks that offer oak woodland (non-riparian native tree) credits.

3.2 Characteristics of Design Reference Site

Previous mitigation work was performed at the 48.5-acre SBCA starting in 2009 for the Feather River Setback Levee and Habitat Enhancement Project (Restoration Resources 2010). The work was done as part of a project to replace a portion of the Feather River west levee with a new setback levee approximately 3,400 feet long that begins near the intersection of Star Bend Road and continues southeasterly to the intersection of Tudor Road. For Phase 1A of the project, 37 existing elderberry

shrubs were transplanted. For Phase 1B, 20 acres of elderberry and native associate plants were installed to enhance VELB habitat. For Phase 1C, approximately 2.46 acres of California blackberry (*Rubus ursinus*) and California rose (*Rosa californica*) were planted to protect an area of cultural significance (Restoration Resources 2010). Phase 2 of the Star Bend mitigation project will consist of planting the remaining approximately 24.5 acres. This acreage will be utilized for the mitigation described in this MMP.

The design characteristics used in the initial mitigation work at SBCA will serve as a reference site for the additional VELB mitigation to be performed at Star Bend for this MMP. These characteristics are described in the report *Habitat Enhancement Plan for the Feather River Setback Levee and Habitat Enhancement Project at Star Bend*, prepared by River Partners and Stillwater Sciences in 2009 for Levee District 1 (LD1)and Wood Rodgers.

Design characteristics for riparian forest and oak woodland will incorporate the species composition and plant spacing found in other natural areas in the project site that will not be disturbed. These areas were field mapped, including field inventories of species composition and size. Additional guidance will be provided by the guidelines for Phase 2 riparian habitat planting outlined in River Partners and Stillwater Sciences (2009).

Design of the FRFCRP has not begun, but the site's ecological setting is similar to that found at the SBCA, and it is likely that design principles used at that site could be applied to the FRFCRP.

As described above, mitigation for USACE jurisdictional habitat and GGS will occur off-site at commercial mitigation and conservation banks.

3.2.1 Previous Work Credit

Much of the design information presented below that is specific to the Star Bend site is taken from the report *Habitat Enhancement Plan for the Feather River Setback Levee and Habitat Enhancement Project at Star Bend*, prepared by River Partners and Stillwater Sciences in 2009 for Levee District 1 and Wood Rodgers.

3.3 Proposed Mitigation Site

3.3.1 Location

The SBCA mitigation site is located on the water side (east) of the new setback levee that was constructed in 2009 on the Feather River, approximately six miles south of Yuba City, Sutter County, California (Figures 1 and 2). The 48.5-acre site is just upstream of the Star Bend boat ramp (near River Mile 18) and is bounded on the north and east by a sharp bend in the river. Access by road is from the west via Star Bend Road off of Garden Highway (River Partners and Stillwater Sciences 2009). The property to the east is part of the O'Connor Lakes unit of CDFW's Feather River Wildlife Area. The unit is managed by CDFW and DWR to provide wildlife habitat, restore native plant communities, and convey Feather River flood events. The land to the west of the levee is primarily orchards.

In 2009, LD 1 of Sutter County constructed the Feather River Setback Levee and Habitat Enhancement Project at Star Bend to replace a portion of existing levee that poses a high risk of

failure in order to decrease the flood stage, velocity, and scour potential; increase and improve floodplain habitat; and improve habitat connectivity between the Abbot Lake and O'Connor Lakes Units of CDFW's Feather River Wildlife Area. The SBCA project created approximately 48.5 acres of floodplain habitat, which included habitat enhancement and onsite mitigation for impacted elderberry.

Approximately 20 acres have been used for elderberry transplants and associated native plants. In early 2012, a fire at the SBCA damaged portions of the site; however, VELB planting losses were minimal. The remaining approximately 24.5 acres are available at the conservation area for compensating for impacts on elderberry shrubs, riparian forest, and non-riparian, native trees from construction of the FRWLP.

The FRFCRP site is located on the east side of the Feather River in the levee setback area created by the TRLIA EIP Feather River Setback Levee project (Figure 1). The FRFCRP is located along a section of the Feather River which currently provides over 3,000 acres of wildlife habitat. Restoration on this site is important because it would add another large block of contiguous habitat (approximately 500 acres) along the lower Feather River; thereby reducing habitat fragmentation.

3.3.2 Ownership Status

The SBCA is under joint control by one of SBFCA's member agencies (Levee District 1) and CDFW. The FRFCRP site is entirely owned by TRLIA.

3.3.3 Jurisdictional Areas

There are no known jurisdictional areas in or near the mitigation activities.

3.3.4 Aquatic Functions

The Feather River Setback Levee and Habitat Enhancement Project at Star Bend constructed in 2009, along with the TRLIA EIP Feather River Setback Levee project, increased the amount of floodplain potentially exposed to inundating flows by approximately 1649 acres. The floodplain restoration allows for higher quality floodplain habitat (better water quality, food inputs, and shelter) for juvenile salmonids and other native species such as Sacramento splittail and steelhead. Organic material produced by native deciduous species restored within the floodplain provides an increased nutrient load for the aquatic environment. This influx of nutrients provides for a greater invertebrate population, thereby creating an abundant food source for fish.

3.3.5 Hydrology and Topography

Both the SBCA and the FRFCRP site were once part of a dynamic system of meandering channels and oxbow lakes that covered an area much wider than the levees of the Feather River Flood Control Project. Levee construction, beginning in the 1860's, confined the channel to its present location, and dams on the Feather and Yuba rivers regulate flows (River Partners and Stillwater Sciences 2009).

To the north of the SBCA, overbank flow from the Feather River periodically (i.e., modeled stage of the 2.5- to 3-year recurrence interval flow [approximately 60,000 cfs]) fills the drainage feature and depressions left by dredger mining (Wood Rodgers, Inc. 2007). In the O'Connor Lakes unit, scour channels, debris accumulations in trees and shrubs, and deposits of sand are evidence of periodic

overbank flow. Periodic maintenance on the O'Connor Lakes Unit is conducted by DWR to increase the conveyance of flood flows and transport sediment (River Partners and Stillwater Sciences 2009).

On the land-side of the existing levee system, rain, flood irrigation and seepage under the levee are the primary sources of surface water. Flooding is used to irrigate the orchard crops, occasionally leaving standing water behind for short periods of time following irrigation. The levee ditch was constructed to contain any water seeping under the toe of the levee, but was only inundated in 1986 and 1997, years in which extremely large flood events occurred (B. Hampton, Manager, LD1, pers. comm., 2007). During those events, water remained for a couple of weeks, generally percolating into soil after flood flows had receded (B. Hampton, Manager, LD1, pers. comm., 2007). In 2006, which had a relatively large flood event, there was no water in the levee ditch (B. Hampton, Manager, LD1, pers. comm., 2007) (River Partners and Stillwater Sciences 2009).

The 2010 initial monitoring report for the Star Bend site (Restoration Resources 2010) stated that surface water was present within the 20 acre habitat area in March 2010 due to low depressions that do not provide sufficient drainage, but began to dry out into April. These areas may have stayed inundated due to the more than average rain received in the regional area during the winter and early spring season.

Elevations of the project area average 45 feet above sea level. Topography is generally flat, with steeper gradients at the river's edge. Several small hills and depressions occur in the O'Connor Lakes Unit as a result of overbank flood scour and deposition, and previous soil excavation and habitat enhancement projects (River Partners and Stillwater Sciences 2009).

Hydrologic function and existing topography of the FRFCRP is likely similar to that found at the SBCA.

3.3.6 Soils and Substrate

The Sutter County Soil Survey (Lytle 1988, NRCS 2008) identifies two soil series within the SBCA. The majority of the site consists of mapping unit 124 Conejo loam, 0 to 2 percent slopes. Conejo soils are very deep, well drained soils formed in alluvium and are observed on alluvial fans and stream terraces. Conejo soils contain about 39.2% sand, 37.3% silt and 23.5% clay. They are classified in hydrologic group B, which have moderately low runoff potential when thoroughly wet and water transmission through the soils is unimpeded.

Mapping unit 134 Holillipah loamy sand, 0 to 2 percent slopes occupies the northern boundary of the site along the Feather River. The Holillipah soils, which contain deep sand to loamy sand derived from mixed alluvium, are frequently flooded, and somewhat excessively well drained (River Partners and Stillwater Sciences 2009).

Detailed soil information for the FRFCRP has not been collected.

3.3.7 Vegetation

Vegetation types at the SBCA were assessed during a September 13, 2006 field survey by EIP Associates (EIP Associates 2007) and were mapped and described during wetland delineation surveys conducted in September 2007 and January 2008 by Stillwater Sciences (Stillwater Sciences 2008b) (River Partners and Stillwater Sciences 2009).

Plant species observed during a September 13, 2006 field survey by EIP Associates included wild oats (*Avena fatua*), ripgut brome (*Bromus diandrus*), soft brome (*Bromus hordeaceus*), turkey mullein

(*Eremocarpus setigerus*), wild mustard (*Brassica* sp.), and prickly lettuce (*Lactuca serriola*) (EIP Associates 2007) (River Partners and Stillwater Sciences 2009).

Riparian forest habitat occurs north of the SBCA, throughout much of the levee ditch, and across much of the O'Connor Lakes unit to the southeast. The area north of the existing levee has a dense canopy of native riparian tree species (approximately one acre), including Fremont cottonwood (*Populus fremontii*), Goodding's black willow (*Salix gooddingii*), northern California black walnut (*Juglans californica* var. *hindsii*), Oregon ash (*Fraxinus latifolia*), and valley oak (*Quercus lobata*). There is a sparse to moderately dense shrub layer with arroyo willow (*Salix lasiolepis*), box elder (*Acer negundo*), California button willow (*Cephalanthus occidentalis*), California rose, and narrowleaf willow (*Salix exigua*). The vine layer is thin, containing predominantly California wild grape (*Vitis californica*) and poison oak (*Toxicodendron diversilobum*). The herbaceous layer is generally absent, with small clearings containing black mustard (*Brassica nigra*), oat (*Avena* sp.), perennial pepperweed (*Lepidium latifolium*), seashore vervain (*Verbena littoralis*), and soft brome (River Partners and Stillwater Sciences 2009).

Portions of the Star Bend setback levee ditch (approximately three acres) are predominantly comprised of a mature canopy of valley oak, occasionally shared with blue elderberry (*Sambucus mexicana*). The understory is fairly sparse, with blue wildrye (*Elymus glaucus*), California blackberry, California rose, California wild grape, Goodding's black willow, narrowleaf willow, and poison oak (River Partners and Stillwater Sciences 2009).

The northwest corner of the SBCA includes the recent mitigation work previously described. For Phase 1A of the project, 37 existing elderberry shrubs were transplanted. For Phase 1B, 20 acres of elderberry and native associate plants were installed to enhance VELB habitat. For Phase 1C, approximately 2.46 acres of California blackberry (*Rubus ursinus*) and California rose (*Rosa californica*) were planted to protect an area of cultural significance (Restoration Resources 2010).

The majority of the land west of the SBCA is a plum orchard that is flood irrigated. Annual grass and weedy forb species occur between the rows of trees, but the sparse distribution and short stature of the forbs indicate they are sprayed with herbicides or otherwise controlled on a regular basis (River Partners and Stillwater Sciences 2009).

The FRFCRP is vegetated with non-native annual grasses and forbs and is devoid of any woody vegetation. The site is mostly surrounded by orchards or other agriculture, but there an area of existing riparian vegetation adjacent to the southwest corner.

3.3.8 Present and Historical Uses of the Mitigation Area

Prior to the arrival of Europeans, Native Americans of the Valley Nisenan populations established villages along the Feather River and its tributaries in the vicinity of the site. The northwest corner of the site is a historic low rise along the river and contains an historic record of an indigenous village site (Bayham 2004) (River Partners and Stillwater Sciences 2009).

John Sutter laid claim to the region when he secured the New Helvetia Land Grant in the 1840s. He promptly built Hock Farm, a rancho in the vicinity of the site, which provided cattle stock that ranged freely along Feather River. W. H. Ashford owned and farmed a section of the west bank as early as 1880, which includes most of the site. In 1880, the O'Connor family owned the parcel to the south of the site where the lakes are located (Sutter County 1880). The 1912 (U.S. Army Corps of Engineers 1912) geologic survey shows dredging activities to the north and south of the site, but not within the

site. The 1912 survey also shows that the site had not been cleared for agriculture (River Partners and Stillwater Sciences 2009).

The SBCA is presently being used for the Phase I and Phase II mitigation work previously described. The SBCA converted 55 acres of former orchard and levee into floodplain habitat. Twenty acres of elderberry shrubs and native associate plants for VELB habitat were planted as part of the initial mitigation. The remaining 35 acres were not planted.

The FRFCRP is currently being managed as open floodplain habitat. Prior to inclusion in the setback area created by the TRLIA EIP Feather River Setback Levee project, the site was largely planted in orchard trees.

3.3.9 Present and Proposed Uses of All Adjacent Areas

The Feather River and three other properties surround the SBCA (i.e., Churkin, Singh, and CDFW properties). The majority of the area west of the site on the land side of the levee is a plum (*Prunus* sp.) orchard that is flood irrigated. The existing levee, operated by LD1, and the Star Bend pumping plant also are located along the site's western boundary. The pumping plant includes pump station discharge lines and irrigation pipelines that bisect the northern portion of the site and continue to adjacent properties. All the property to the east of the SBCA is part of the O'Connor Lakes unit of CDFW's Feather River Wildlife Area. The unit is managed by CDFW and DWR to provide wildlife habitat, restore native plant communities, and convey Feather River flood events.

The FRFCRP is surrounded by orchards or other agricultural land uses to the north, south, and east. To the west is an area of riparian vegetation.

3.4 Created/Restored Habitats

3.4.1 Compensation Ratios

The amount of proposed compensation is based on the significance of the habitats affected to fish and wildlife resources, USFWS general fish and wildlife mitigation recommendations (Fish and Wildlife Coordination Act Report), USFWS GGS programmatic biological opinion and VELB Conservation Guidelines. Compensation ratios may be adjusted at the project preconstruction engineering and design stage as a result of further assessments of habitat values and functions in consultation with the USFWS and other resource agencies.

VELB Habitat

Before construction begins, USACE will compensate for direct effects on elderberry shrubs by transplanting shrubs that cannot be avoided to the SBCA. Elderberry seedlings or cuttings and associated native species will also be planted in the conservation area. Each elderberry stem measuring 1 inch or greater in diameter at ground level that is adversely affected (i.e., transplanted) would be replaced, in the Star Bend area, with elderberry seedlings or cuttings at a ratio ranging from 1:1 to 8:1 (new plantings to affected stems). The numbers of elderberry seedlings/cuttings and associated riparian native trees/shrubs to be planted as replacement habitat are determined by stem size class of affected elderberry shrubs, presence or absence of exit holes, and whether the shrub lies

in a riparian or non-riparian area. Stock of either seedlings or cuttings would be obtained from local sources (including the project area if acceptable to USFWS).

At the discretion of USFWS, shrubs that are unlikely to survive transplantation because of poor condition or location, or a plant that would be extremely difficult to move because of access problems, may be exempted from transplantation. In cases where transplantation is not possible, minimization ratios would be increased to offset the additional habitat loss.

The relocation of the elderberry shrubs will be conducted according to USFWS-approved procedures outlined in the Conservation Guidelines (U.S. Fish and Wildlife Service 1999a). Elderberry shrubs within the project construction area that cannot be avoided will be transplanted during the plant's dormant phase (November through the first 2 weeks of February). A qualified biological monitor will remain onsite while the shrubs are being transplanted.

Property inaccessibility and the high density of vegetation along portions of the Feather River riparian corridor limited the number of elderberry shrubs that could be surveyed (73 shrubs were surveyed). For this reason, compensation for the removal of approximately 162 shrubs was estimated based on the average number of stems in each stem diameter range for the 73 shrubs that could be surveyed (see Table 3-1). Those averages are as follows.

- Number of stems ≥1 inch and ≤3 inches = 4.
- Number of stems >3 inches and <5 inches = 1.
- Number of stems ≥5 inches = 1.

Because most of the shrubs are located in riparian habitat and did not have exit holes, the compensation ratios for these conditions were used.

Table 3-1. Estimated Compensation for Elderberry Shrubs Removed

Stem Diameter	Number of Stems[1]	Seedling Ratio[2]	Native Plant Ratio[2]	Total Seedlings	Total Native Plants
Stems ≥1" to ≤3"	648	2:1	1:1	1,296	1,296
Stems >3" to <5"	162	3:1	1:1	486	486
Stems ≥5"	162	4:1	1:1	648	648
Total	972			2,466	2,466

N/A = not applicable.

1 The number of stems per shrub was based on the average number of stems in each stem diameter range for the 72 shrubs that could be surveyed. Those averages are as follows: number of stems ≥1" and ≤3" = 4; number of stems >3" and <5" = 1; and number of stems ≥5" = 1.

2 Ratios are based on shrubs within riparian habitat with no VELB exit holes.

Based on the information in Table 3-1, 493 elderberry units, or 20.38 acres, will be required to fully mitigate for project impacts per USFWS VELB Conservation Guidelines. All of this mitigation will occur at the SBCA.

Riparian Habitat and Oak Woodland

Project impacts would be mitigate at a 2:1 compensation ratio as listed in Table 3-2. The USFWS Draft Fish and Wildlife Coordination Act Report (FWCA report) recommended at least a 2:1 replacement ratio to compensate for loss in functions and values.

USACE Section 404 Jurisdictional Areas

Project impacts would be mitigated at a 2:1 compensation ratio per the USFWS FWCA report. Of the 5.178 acres of impact (Table 2-8), approximately 4.10 acres would be compensated onsite in conjunction with relocation of the Sutter Butte canal.

Table 3-2. Anticipated Project Impacts to Sensitive Resources and Proposed Compensatory Mitigation

Impact Type	Impact Unit	Impact Quantity	Mitigation Need	Mitigation Area
Riparian Forest and Riparian Scrub Shrub	acres of cover type	42.50 acres	85.00 acres (2:1 replacement ratio[1])	85.00 acres at 10' o.c. plant spacing
Oak Woodland	acres of cover type	1.30 acres	2.60 (2:1 replacement ratio1[1])	2.60 acres at 10' o.c. plant spacing
Elderberry	individual shrubs and total stem count within each shrub	162 shrubs with 972 total stems	162 transplants, 2,466 elderberry seedlings, and 2,466 native associates	20.38 acres [2] (493 elderberry units)
Giant Garter Snake	acres of permanent impact	0.00 aquatic 3.54 acres upland	3.54 acres (3:1 replacement ratio[3])	10.62 acres
Jurisdictional Waters	acres of permanent impact	1.71 acres	3.42 acres (2:1 replacement ratio1[1])	3.42 acres

Notes:

1 Compensation ratio from USFWS Draft Fish and Wildlife Coordination Act Report .

2 Compensation acreage determined based on USFWS VELB Compensation Guidelines.

3 Compensation ratio from USFWS Programmatic Biological Opinion (U.S. Fish and Wildlife Service 1997)

To fully mitigate for project impacts, approximately 87.60 acres of land will be required (elderberry transplantation/compensation (20.38 acres) met through riparian forest compensation). If all of the 24.5 acre SBCA Phase 2 land is used for mitigation purposes, approximately 63.10 acres of land would be required at the FRFCRP site to accommodate the remaining mitigation.

Compensation for GGS and Section 404 wetland impacts would be met by purchase of 14.04 acres of equivalent credit through mitigation or conservation banks (i.e., Sutter Basin Conservation Bank and River Ranch Wetland Mitigation Bank).

3.4.2 Long-Term Goal(s)

The long-term ownership goal is to merge the SBCA with CDFW's adjoining O'Conner Lakes and Abbott Lakes Wildlife Units. A similar goal with an appropriate public agency is also envisioned for the FRFCRP.

Given the presence of good soils and potential exposure to frequent flooding, both project areas should sustain rapid growth of restored riparian species throughout the life of the project implementation (approximately 3 years). An "over-planting" approach is used to rapidly establish native riparian species. Over-planting the project site will eliminate the need for any additional replanting efforts. The ultimate ecological objective for over-planting is that in time the area will thin

out and create a complex of open canopy, dense forest, and dead snags, all of which provide benefits to wildlife (River Partners and Stillwater Sciences 2009).

It is anticipated that at the end of the 3-year establishment period, 70% survivorship of woody species will be attained. Over time, mortality based on differences of soil textures and water table depths will create areas of complex, open canopy, dense forest, and dead snags, all of which create habitat for wildlife (River Partners and Stillwater Sciences 2009).

3.4.3 Aquatic Functions

No jurisdictional open water habitat will be created at the either site. The Feather River Setback Levee and Habitat Enhancement Project at Star Bend, together with the TRLIA EIP Feather River Setback Levee project, increased the amount of floodplain potentially exposed to inundating flows by approximately 1649 acres. The floodplain restoration allows for higher quality floodplain habitat (better water quality, food inputs, and shelter) for juvenile salmonids and other native species such as Sacramento splittail and steelhead. Organic material produced by native deciduous species restored within the floodplain provides an increased nutrient load for the aquatic environment. This influx of nutrients also provides for a greater invertebrate population, thereby creating an abundant food source for fish. The additional mitigation plantings for VELB habitat and plantings for riparian forest and non-riparian, native trees proposed for this MMP will further increase the food inputs and shelter for aquatic species by expanding the acreage of floodplain forest and upland habitat at the site (River Partners and Stillwater Sciences 2009).

3.4.4 Hydrology and Topography

The long-term source of water for the new SBCA and FRFCRP mitigation plantings will be groundwater and Feather River flood flows. After the plants have become established enough to discontinue irrigation, groundwater will be the primary source of water. Additional surface water flooding will be provided during when the Feather River flows, most often high during spring and early summer snowmelt. Hydraulic modeling shows that the Feather River overbanks at locations north of the Star Bend site approximately once every 2.5 to 3 years (Wood Rodgers, Inc. 2007, as cited in River Partners and Stillwater Sciences 2009). It is anticipated that flooding will occur at the proposed mitigation site on a similar recurrence interval frequency. The duration of flooding will depend upon water year type. In some years, the river will not overtop its banks and inundate the site. In other years, flooding may occur over a period of several days, while in the wetter years the site could be flooded for several weeks. Flood water that overbanks into the site will generally flow downgradient from the north to south and eventually infiltrate into the ground or recede back into the river when the river's flood stage decreases.

3.4.5 Soils and Substrate

The majority of the SBCA consists of 124 Conejo loam soils, which are very deep, well drained soils formed in alluvium and are observed on alluvial fans and stream terraces. They are classified in hydrologic group B, which have moderately low runoff potential when thoroughly wet and water transmission through the soils is unimpeded. These soils are highly suitable for supporting elderberry shrubs and associated plans for VELB habitat, and for supporting riparian and non-riparian tree species. The same species that will be planted in the soils at the SBCA are currently growing in the same soils in lands in the site's vicinity.

Detailed soil information has not been collected at the FRFCRP site.

3.4.6 Vegetation

The target plant communities and species at the SBCA and FRFCRP site will include riparian forest, non-riparian native trees, and elderberry shrubs and associated plants for VELB habitat (Table 3-3).

Table 3-3. Woody Planting Species for Star Bend Conservation Area

Common Name	Scientific Name
Coyote brush	*Baccharis pilularis*
Mule fat	*Baccharis salicifolia*
Buttonbush	*Cephalnathus occidentalis*
California Rose	*Rosa californica*
California Blackberry	*Rubus ursinus*
Sandbar willow	*Salix exigua*
Arroyo willow	*Salix lasiolepis*
Blue elderberry	*Sambucus mexicana*
Valley oak	*Quercus lobata*
Interior live oak	*Quercus wislizeni*
Oregon ash	*Fraxinus latifolia*
Fremont cottonwood	*Populus fremontii*
Box elder	*Acer negundo*

The detailed planting plan is described below in Section 5.2.

Chapter 4
Success Criteria and Monitoring

4.1 Success Criteria

For this MMP, a "success criterion" is a measure that indicates whether the mitigation goals have been achieved at the end of the monitoring period. The mitigation will be evaluated annually using the annual performance standards. Table 4-1 summarizes the monitoring success criteria for restored and enhanced wetlands, drainages, and upland and riparian areas.

Table 4-1. Monitoring Success Criteria for Planted Areas at the SBCA and FRFCRP site

Monitored Characteristic	Monitoring Year	Success Criteria Standards
Riparian Vegetation		
Plant survival	1–5	Demonstrate at least 60% survival of all riparian vegetation plantings after 5 years.
Oak Woodland		
Plant survival	1-5	Demonstrate at least 60% survival of all non-riparian native plant plantings after 5 years.
Valley Elderberry Longhorn Beetle		
Plant survival	1-10 or 1,2,3,5 7,10 and 15	Demonstrate at least 60% survival of all elderberry and native associate plantings

A minimum survival rate of at least 60% must be maintained throughout the monitoring period. Within one year of discovery that survival has dropped below 60 percent, failed plantings will be replaced to bring survival above this level. USACE in consultation with the resource agencies will make any determination as to replacement responsibilities arising from circumstances beyond its control, such as plants damaged or killed as a result of severe flooding or vandalism.

4.2 Monitoring

4.2.1 Methods

Monitoring will be quantitative and qualitative. The monitoring methods that will be used during the annual performance monitoring are described below by habitat and restoration/mitigation category.

Annual Surveys

At the end of the first growing season, the restoration contractor will conduct a complete census of all woody species planted. The data are best analyzed using a database to calculate survivorship, and to determine any changes to or omissions from the original planting design. During years two and three, woody species plantings will be sampled to determine survivorship, growth, and coverage.

Sampling of native grass and herbaceous understory plantings will also be conducted (River Partners and Stillwater Sciences 2009).

Census

At the end of the first growing season, a census noting survivorship for each location (alive, dead, or missing/not planted) will be conducted. The census allows for pattern analysis to examine the effects of soil, hydrology, or other factors affecting survivorship. During implementation, changes in the planting design are possible (or even desirable) and should be noted. Deviations in planting can also be recorded during the census. Results of the census will be used to determine progress towards performance criteria and replanting, if necessary (River Partners and Stillwater Sciences 2009).

Permanent Plot Sampling

After the initial census, subsequent monitoring (years 2 and 3) utilizes permanent plots to collect data on overall survivorship, height, and cover. The sampling procedure is modified for a restoration setting from protocol developed by Dr. Dave Wood (CSU, Chico) to establish permanent plots in riparian forests (personal communication). Some of the methods have been adapted from Elzinga et al. 1998. Comparison of survivorship between the sampling procedure and census indicates that sampling estimates are within 2% and provide additional information on cover and recruitment (results based on data from field 4 of the Ord Bend Unit, Sacramento River National Wildlife Refuge (River Partners 2003)). The sampling procedure may also be used to compare pre- and post-restoration vegetation, if the permanent plots are installed beforehand (River Partners and Stillwater Sciences 2009).

Plot location and Size

All samples are based on 20 m x 50 m (1,000 m^2) plots (quadrats) placed with the long axis oriented in a north-south direction. Permanent plot locations will be selected by stratifying the field and using the grid cell method (overlaying each field with a 20 m x 50 m grid) to select sampled plots. Plots that extend past the plantable area are generally rejected. In addition, we exclude locations that are not characteristic of that particular area. In general, a plot should be established every 5-20 acres. The plots serve as areas to collect information on woody, shrub, and herbaceous species (if desired) (River Partners and Stillwater Sciences 2009).

Once each specific plot location is randomly selected, its field location will be permanently recorded at the upstream, inland corner of the plot. The position will be recorded with a GPS unit, and, in subsequent monitoring years, will be reestablished in the same position (River Partners and Stillwater Sciences 2009).

Measurements

At each plot, cover and height measurements of all shrubs and trees inside the 20 m x 50 m plot will be recorded. To assess the survivorship of planted species, we will note their status: alive, dead, or missing (not planted). Because restoration activities often create conditions that favor the survivorship and natural recruitment of native plants, newly recruited native riparian woody species will also be recorded. The estimate of aerial cover of both trees and shrubs will be based on the longest diameter through the horizontal plane of the plant's drip line, a thin line at which a drop

of water would fall from the outward most oriented leaf (River Partners and Stillwater Sciences 2009).

4.2.2 Monitoring Schedule

The riparian forest and oak woodland non-riparian native tree restoration areas will be monitored annually during Years 1 through 5 following completion of mitigation project implementation. First year monitoring will not be completed until after one full growing season for vegetation has passed since completion of construction. The implementing agency will submit an annual report at the end of each monitoring year and a final report to USFWS and other resource agencies for review and approval. These areas will be monitored annually during May or June.

The population of valley elderberry longhorn beetles, the general condition of the conservation area, and the condition of the elderberry and associated native plantings in the conservation area must be monitored over a period of either ten (10) consecutive years or for seven (7) years over a 15-year period. The applicant may elect either 10 years of monitoring, with surveys and reports every year; or 15 years of monitoring, with surveys and reports on years 1, 2, 3, 5, 7, 10, and 15. The conservation plan provided by the applicant must state which monitoring schedule will be followed. No change in monitoring schedule will be accepted after the project is initiated. If conservation planting is done in stages (i.e., not all planting is implemented in the same time period), each stage of conservation planting will have a different start date for the required monitoring time. In any survey year, a minimum of two site visits between February 14 and June 30 of each year must be made by a qualified biologist (River Partners and Stillwater Sciences 2009).

4.2.3 Photo-Documentation

The progress of the restoration areas will be documented photographically. Permanent photo-documentation stations will be established at several points throughout both sites. The locations of photo-documentation stations will be determined during the first year of the monitoring period, and the locations will be identified in the field and mapped, either on a map or by using a GPS receiver.

The number of photographs taken at a given photo-documentation station will vary, depending on the area and habitat. Photos will include panoramic views taken from a high point at the site that will not be obscured in future years by growing vegetation. A sufficient number of stations will be established to ensure that the photographs provide a visual record of the sites. Photographs will be taken during June of each monitoring year. Additional representative photographs may be taken at other times of the year at the implementing agency's discretion.

Chapter 5
Implementation Plan

5.1 Site Preparation

5.1.1 Avoidance Measures

Site preparation during the first phase of work will involve implementing the following avoidance measure actions related to preconstruction surveys and construction staking.

- Stake the limits of the work area, including construction, staging, and access areas.
- Perform pre-construction surveys for giant garter snake, western pond turtle, nesting birds/raptors, native bats and valley elderberry longhorn beetle.
- Stake the limits of Environmentally Sensitive Areas (ESAs).
- Place protection fencing around the perimeter of ESAs.
- Place silt fencing, when appropriate, around the perimeter of ESAs.
- Perform preconstruction surveys of affected drainages.

Prior to construction, the construction contractor, under the supervision of SBFCA, will survey and stake the location of the work area and ESAs. These locations will be based on the project construction documents prepared by SBFCA and will be in accordance with this MMP.

The construction contractor will install protective fencing and/or silt fencing according to the specifications in the project construction documents around ESAs to be preserved. Protective fencing will consist of orange plastic-mesh fencing that is secured to metal T-posts. To prevent soil or sediment from entering sensitive areas, silt fencing may be installed around areas to be preserved. Silt fencing may be used in combination with protective fencing and will be installed in accordance with the Stormwater Pollution Prevention Plan that will be prepared by the contractor and the best management practices identified in the project construction documents. This silt fence will also serve as exclusion fencing to aid in preventing wildlife from entering active construction areas.

Prior to initial ground disturbance, preconstruction surveys for giant garter snake, western pond turtle, nesting migratory birds/raptors, and roosting bats will be conducted to ensure that these sensitive species are not directly or indirectly affected by restoration activities. Nesting bird and raptor surveys will be conducted no more than 14 days prior to the start of construction to ensure that no active bird nests are present within 50 feet and no raptor nests are present within 300 feet of restoration activities. A bat emergence survey will also be conducted within 14 days prior to construction to ensure that no trees supporting maternal roosts are present within or adjacent to restoration activities.

If a special-status species is identified within or adjacent to restoration activities, appropriate no-disturbance buffers will be established for breeding sites or the individual(s) will be allowed to passively move out of the construction area. Buffers will be determined by a qualified biologist, coordinating with the appropriate regulatory agency, and will depend on the species identified and

one or more of the following factors: season of activity, level of noise or construction activity, level of ambient noise in the vicinity, and line-of-sight.

5.1.2 Pest Plant Removal

Weed control is necessary for the successful establishment of native plants and improvement of habitat. The weeds of greatest concern at the site are black mustard, yellow starthistle and pepperweed (River Partners and Stillwater Sciences 2009).

In areas to be planted with herbaceous species, spraying and mowing for an entire season before planting is recommended. Once the herbaceous species are planted, weed control methods will be mowing, possibly applying 2,4-D to control broad leaf pressure. The restoration contractor will abide by county and state herbicide permitting and reporting requirements. Roundup® (glyphosate) and 2,4-D (for broad-leaf control in native grass planting) are likely to be the most commonly used herbicides on the project. Rodeo® (for areas adjacent to water bodies), Telar® (for pepperweed control), Poast® (for post-emergence control of annual grasses in herbaceous understory planting) and Garlon™ (for woody species control) may also be used (River Partners and Stillwater Sciences 2009). No herbicide will be applied on days when wind speed is high enough to cause drift onto adjacent natural or planting areas.

Phase 2 planting areas that are within 200’ of any elderberry plantings or transplants in the Phase 1 planting area will not be sprayed with any herbicide during site preparation activities. Only hand or mechanical weed removal methods will be employed in these areas.

5.1.3 Construction Monitor

An individual familiar with this mitigation and monitoring plan will supervise all phases of construction of the project. These phases may include:

- Layout of proposed other waters of the United States boundaries prior to construction.
- Placement and installation of ESA fencing.
- Site preparation/vegetation clearing operations.
- Planting and seeding operations.

The construction monitor will have authority to direct equipment operators and will submit a summary report to USACE documenting construction observations and any problems that arise.

5.2 Planting/Seeding

5.2.1 Planting Plan

A conceptual planting plan and plant palette for the SBCA is shown in Figures 3 and 4. Planting of the SBCA and FRFCRP site will consist of the following species for Elderberry mitigation, riparian mitigation, oak woodland (non-riparian native tree mitigation) and upland seed mix (Tables 5-1 through 5-4):

Table 5-1. Plant Palette for Elderberry Mitigation Areas

Scientific Name	Common Name	Percent of Planting Mix	Plant Spacing (feet on-center)	Container Size
Sambucus mexicana	Blue elderberry	50		1-gallon
Baccharis pilularis	Coyote brush	10		1-gallon
Populus fremontii	Fremont cottonwood	10		1-gallon
Rosa californica	California rose	10	10’ O.C.	1-gallon
Quercus lobata	Valley oak	10		1-gallon
Salix lasiolepis	Arroyo willow	5		1-gallon
Salix exigua	Sandbar willow	5		1-gallon

Table 5-2. Plant Palette for Riparian Mitigation Areas

Scientific Name	Common Name	Percent of Planting Mix	Plant Spacing (feet on-center)	Container Size
Populus fremontii	Fremont cottonwood	25		1-gallon
Box elder	Acer negundo	12.5		1-gallon
Oregon ash	Fraxinus latifolia	12.5		1-gallon
Rosa californica	California rose	10		1-gallon
Quercus lobata	Valley oak	10	10’ O.C.	1-gallon
Salix lasiolepis	Arroyo willow	10		1-gallon
Salix exigua	Sandbar willow	10		1-gallon
Rubus ursinus	California blackberry	5		1-gallon
Cephalanthus occidental	Buttonbush	5		1-gallon

Table 5-3. Plant Palette for Oak Woodland (Non-Riparian Native Tree Mitigation Areas)

Scientific Name	Common Name	Percent of Planting Mix	Plant Spacing (feet on-center)	Container Size
Quercus lobata	Valley oak	75		1-gallon
Baccharis pilularis	Coyote brush	15	10’ O.C.	1-gallon
Quercus wislizeni	Interior live oak	10		1-gallon

Table 5-4. Upland Seed Mix

Botanical Name	Common Name	Pounds Pure Live Seed Per Acre (Slope Measurement)
In-Stream Bench Seeding (Type 1)		
Leymus triticoides	Creeping wild rye	10
Hordeum brachyantherum ssp californicum	Meadow barley	12
Elymus glaucus	Blue wild rye	12
Eschscholizia californica	California poppy	2
Lupinus succulentus	Arroyo lupine	4
Triticum x Elymus	Regreen	25

5.2.2 Nature and Source of Propagules

Container plants will be purchased from a commercial nursery located within two hours of the project site. If possible, container plants will be grown from seeds or cuttings collected at or near the project site in order to populate the site with species ecotypes that are adapted to local ecological conditions.

5.3 Irrigation

Because of the dry summers typical of the climate in the area, irrigation will be required for plant establishment and survival. Irrigation should be applied with the goal that plants will become self-sufficient by the end of the third growing season (River Partners and Stillwater Sciences 2009).

In the first growing season, the rapidly growing seedlings have roots only in the surface (the top 1–2 feet) of the soil profile. The rooting zone must be kept moist through the season to ensure optimum growth and survival. Because of the sandy soils at the site and water table depths of over 20 feet, the soil moisture of the fields planted with woody species will need to be closely monitored. The intervals between irrigations are dependent upon soil texture, depth to water table, the weather conditions, and plant water stress. Because a mixture of species with different water demands is proposed, the plants must be carefully observed to maintain a balance of soil moisture that is acceptable for xeric species like valley oak and elderberry as well as more mesic species like cottonwood and willow (River Partners and Stillwater Sciences 2009).

Prior to project implementation, a more detailed irrigation design will be developed. All irrigation water at the SBCA will be provided by an existing well located in the O'Connor Lakes Unit, near the midpoint of the eastern edge of the project area. The mainline will run west from the well (River Partners and Stillwater Sciences 2009). Irrigation water at the FRFCRP site will be supplied from existing wells on-site.

Based on knowledge of the site and plant design, the following are expected to be the requirements for the system:

- The plant spacing throughout most of the restoration and mitigation areas will be 10-foot-wide rows with a 10-foot distance down the planting rows, and rows planted in an approximate east-west direction.
- Planting rows will curve and run parallel to flood flows. The irrigation system will utilize existing wells as water sources.
- The drip-line emitters will be spaced, with three emitters per plant 12 inches apart. The design flow will be 0.6 gallons per hour per emitter (1.8 gallons per plant per hour).

Within selected areas, soil-moisture sensors will be placed throughout both planting areas. Sensors will be installed at depths of 12 and 36 inches (River Partners and Stillwater Sciences 2009).

In conjunction with these measurements, plant stress observations before and after irrigation periods will be necessary to critically judge the timeliness and effectiveness of irrigation. Measurements provide the most direct assessment of soil moisture. Table 5-5 provides the irrigation goals of the project (River Partners and Stillwater Sciences 2009).

Table 5-5. Irrigation Goals for the Star Bend Conservation Area

Year	Goal	Frequency
1	Keep the shallow roots (1–2 feet) of young plants moist to ensure optimum growth and survival.	Utilize soil moisture probes to monitor and maintain moisture throughout the soil column.
2	Encourage deep rooting and enhance field access to facilitate weed control.	Deliver less frequent but longer irrigations.
3	Encourage deep rooting and enhance field.	Continue with long irrigations and extend the access to facilitate weed control period between irrigations.

Source: River Partners and Stillwater Sciences 2009

The strategy for the second and third year is to train the roots to grow deep. Roots at depth (5–15 feet) will need less water and may be able to tap into the water table on the site and outcompete more shallow-rooted weeds. Less frequent, deep watering will encourage roots to grow deeper, well below the roots of the weeds, allowing the tree exclusive use of this deep moisture. As the tree's roots grow deeper, the times between irrigations become longer; this allows the soil surface layers to dry, thereby reducing weed vigor (River Partners and Stillwater Sciences 2009).

We anticipate that the well-drained, sandy soils, and relatively deep groundwater present on the site, will require frequent irrigations and careful observation of water stress. These areas may dictate the frequency of watering on the site. Field managers should use a combination of methods including evapotranspiration estimates, soil probes, gypsum blocks, and plant water stress signs to assess soil moisture and alter the irrigation regime (River Partners and Stillwater Sciences 2009).

5.4 Implementation Schedule

The mitigation project would be implemented concurrent with project construction. Elderberry shrub transplant activities would take place during the dormant period. Mitigation maintenance will begin immediately following completion of the mitigation activities.

Chapter 6
Maintenance during Monitoring Period

6.1 Maintenance Activities

6.1.1 Overall

Mitigation and riparian vegetation enhancement activities at the SBCA and FRFCRP site will be monitored by SBFCA and/or CDFW (or their designee) to determine if mitigation requirements and habitat enhancement goals and performance standards are being met. Annual monitoring of riparian vegetation establishment, including natural native plant recruitment, nonnative plant recruitment, and plant development, will determine if remedial actions are needed. Annual monitoring reports will be submitted by December 31 of each year. If monitoring reveals that performance standards are not being met, remedial activities may be implemented (River Partners and Stillwater Sciences 2009).

6.1.2 Irrigation

All planted areas within the mitigation site will be irrigated during the establishment period. Soil moisture should be checked at least twice weekly and plantings should be qualitatively assessed for signs of drought stress. All planting areas will be irrigated at least twice weekly from May through October. Irrigation event duration should be adjusted depending on soil moisture and prevailing weather conditions but should be of sufficient length to maintain vigorous plant growth and encourage deep root growth.

Between November and April soil moisture at the mitigation site will be checked twice a month, and, if necessary, the irrigation system will be run for approximately ½ hour or long enough to replenish soil moisture around the plantings in the mitigation area.

6.1.3 Invasive Plant Control

Weeding efforts will occur on a monthly basis from April to October of each year for 5 years. Weed control will consist of controlling populations of invasive weeds when they occur in the planting areas. Weed control will consist of mechanical or manual removal only. At no time will herbicides be used in the planted areas. Plant Replacement

Dead of diseased plants will be replaced immediately upon their discovery with new plants of the same size and species. Plant species substitutions will only be permitted with the prior approval of the resource manager.

6.1.4 Plant Replacement

Dead of diseased plants will be replaced immediately upon their discovery with new plants of the same size and species. Plant species substitutions will only be permitted with the prior approval of the resource manager.

6.1.5 Irrigation System Maintenance

The resource manager will maintain the irrigation system during the plant establishment maintenance period. Maintenance will include the repair and replacement of parts, ensuring the system is delivering the required amount of water, and ensuring the system is fully operational at all times. The resource manager will regularly inspect the irrigation system, adjust and replace parts as necessary.

6.1.6 Reporting and Record Keeping

The resource manager will prepare and keep current a record of monthly maintenance performed on the project. The record will identify, at a minimum, project name, mitigation planting zones, current date and establishment period. The record will also identify and discuss weed control performed, irrigation activity and maintenance, plant health, vandalism, site feature conditions, general observations, total precipitation for the month, personnel onsite and any other pertinent information describing site conditions and activities performed during the month.

Chapter 7
Proposed Monitoring Reports

7.1 Due Dates

USACE will notify resource agencies of the due date (month and day) for the annual monitoring report.

7.2 As-Builts

As-built planting and irrigation drawings of the mitigation areas will be prepared by the implementing agency following completion of the project. The as-built drawings will be prepared on 40-scale or larger-scale maps and will indicate the following features.

- Extent of planting areas (in plan view).
- Location of any permanent markers (e.g., identification stakes, photo documentation stations).
- Seeded areas.
- Other pertinent features.

Any changes from the original mitigation construction plans will be indicated in indelible red ink. The as-built drawings will be submitted to USACE and other resource agencies within 6 weeks of construction completion.

7.3 Annual Reports

7.3.1 File Number

Any appropriate USACE permit/file numbers will be included on correspondence, including the cover and title page of all reports.

7.3.2 Contents

The following text describes the content that will be included in the mitigation monitoring reports.

Years of Full Monitoring

Annual monitoring report will be prepared by SBFCA in accordance with USACE guidance (U.S. Army Corps of Engineers 2004 and 2006) by December 31 of each monitoring year. Each full-year monitoring report will include the following information.

- Project Information
    - Project name and a summary of the project location and description including date of project commencement and completion.

  - Contact information for the applicant.
  - A list of the names, titles, and companies of the people who prepared the content of the annual report or participated in monitoring activities that year.
  - USACE permit file number.
  - Type and acres of impacted habitat.
  - The monitoring year.
  - Information on any required performance bonds or surety, if applicable.
- Compensatory Mitigation Site Information
  - Location of the mitigation site.
  - Purpose and goals of the mitigation.
  - Dates of mitigation site construction and completion.
  - Dates and summary of maintenance and performance monitoring visits.
  - Contact information for the responsible party for the mitigation site.
  - Summary of remedial actions, if applicable.
- Figures and Graphics
  - Location map.
  - Mitigation site map indicating restored habitats, monitoring locations, photo documentation stations, and any other pertinent site features.
- List of USACE-approved success criteria
- Monitoring Results
  - A summary and analysis of the monitoring results, including an evaluation of site conditions in the context of the performance standards and success criteria, including a comparison with previous monitoring years.
  - Summary of field data taken to determine compliance.
- Problems noted and proposed remedial measures
  - Problems noted during the course of the monitoring surveys or other site visits.
  - Management recommendations, including discussion of areas with inadequate performance and recommendations for remedial action.
- Appendices
  - Original data sheets and technical appendices, as required by USACE and other resource agencies.
  - Photo-documentation of the planting areas using photographs taken during the monitoring surveys.

Final Monitoring Report

A final monitoring report will be submitted by SBFCA after all performance monitoring at the mitigation site is complete. The final report will be prepared by a qualified biologist and will evaluate whether the mitigation has achieved the goals and success criteria set forth in the approved MMP. The final report will be submitted within 90 days of the end of the monitoring period to USFWS and other resource agencies for review and approval.

Chapter 8
Potential Contingency Measures

8.1 Initiating Procedures

If the final report indicates that the mitigation project has been unsuccessful, in part or in whole, based on the approved success criteria for physical and ecological functions, the implementing agency will evaluate the causes for not meeting the criteria and submit a revised or supplemental mitigation plan within 90 days of the end of the monitoring period for the review and approval of USFWS to compensate for those portions of the original program that did not meet the approved success criteria. The approved remedial measures will be developed based on the qualitative and quantitative monitoring results to determine the most effective remedy. The revised mitigation plan containing the remedial measures will be processed as an amendment to the original permit unless USFWS determines that no permit amendment is required.

If, after all remedial measures have been implemented, it becomes evident that the permit requirements cannot be satisfied according to the proposed mitigation plan, the implementing agency will coordinate with the permitting agencies to develop a contingency plan to be approved by all parties.

8.2 Contingency Funding Mechanism

USACE and SBFCA will fund any necessary contingency mitigation efforts, including additional planning, implementation, and monitoring.

Chapter 9
Completion of Mitigation Responsibilities

9.1 Notification

USACE will notify USFWS of completion of mitigation responsibilities in conjunction with the final annual report. A minimum of 2 years will be required after the completion of all maintenance activities (e.g., irrigation, replanting, rodent control, fertilization) before final success criteria will be considered met.

9.2 USFWS Confirmation

After receiving the final monitoring report, USFWS will conduct a site visit and confirm in writing to the implementing agency that the mitigation obligations and responsibilities have been met, or if not met, describe additional actions required.

Chapter 10
Long-Term Management

10.1 Property Ownership

The SBCA is owned in part by LD 1 and in part by CDFW. The FRFCRP site is entirely owned by TRLIA.

10.2 Management Plan

10.2.1 Purpose

This section only addresses permittee-responsible mitigation, as compensatory mitigation not addressed below will be deemed satisfied and complete through purchase of credits from a commercial mitigation bank approved by the appropriate resource agencies.

The purpose of this long-term management plan is to ensure the mitigation site is monitored and maintained in perpetuity. This management plan provides management objectives and tasks to monitor, manage, maintain and report on the mitigated natural resources. Routine monitoring and minor maintenance tasks are intended to assure the viability of the mitigation site's functions and values. This long-term management plan will take effect after the completion of the monitoring period, once it has been determined by the appropriate resource agencies that the mitigation project has achieved its project objectives and outlined performance standards for each habitat type have been reached. During the long-term management period the gradual withdrawal of the required support systems (e.g., irrigation and frequency of maintenance) for mitigation resources will begin. The goal for each mitigation site is to become fully self-sustaining. The designated resource manager(s) will oversee all long-term management activities.

10.2.2 Resource Manager

The resources managers are LD1 and DFW. The resource managers, and subsequent resource managers, upon transfer, shall implement this long-term management plan. Long-term management tasks shall be funded through the mitigation site's endowment fund. The resource manager(s) shall be responsible for providing an annual report, consisting of a description of the management tasks and total funds expended, to the appropriate resource agencies. Any subsequent modification to the mitigation sites by the resource manager(s) or their representatives must be approved by the appropriate resources agencies and the necessary permits obtained.

10.2.3 Management Approach

The general management approach to the long-term maintenance of the mitigation site will be to maintain quality habitat functions and values for each mitigated resource and on-going monitoring and maintenance of the mitigation site. When necessary, adaptive management will be used to adjust management practices, including corrective actions as determined to be appropriate by the

appropriate resources agencies in discussion with the resource manager(s). Adaptive management includes those activities necessary to address the effects of climate change, fire, flood, or other natural events, force majeure, etc. Before considering any adaptive management changes to the long-term management plan, the appropriate resource agencies will consider whether such actions will help ensure the continued viability of the mitigation site's biological resources.

10.2.4 Long-Term Management Needs

The expected long-term management needs and activities necessary to maintain the mitigation site will be resource specific long-term maintenance activities as described below and other general maintenance activities such as exotic species elimination, clean-up and trash removal, infrastructure management such as gate, fence, road, culvert, signage and drainage-feature repair, and other maintenance activities necessary to maintain the functions and values of the mitigation site.

Biological Monitoring

Annual field surveys will be conducted to qualitatively assess and record the general conditions of the riparian, non-riparian native trees, and elderberry planting areas. General hydrology, general vegetative cover, structure and native plant diversity, invasive species, and erosion sites will be recorded, evaluated and mapped during site examinations in the spring. Notes to be made will include observations of species encountered, general condition of the planting areas, occurrences of erosion, and presence of significant populations of non-native invasive plants.

Diversity of native plant species will be maintained by replanting native species as specified in the original planting plan, or when appropriate, introduction of additional native species. Native species from various plant communities should be selected to complement natural seral processes that may take place as the mitigation site ages and matures.

Other Site Management Activities

Other site management and maintenance activities are those that may be required on an as-needed basis. Items listed below may be observed, implemented, and/or recorded during annual site observation and included in annual report to the appropriate resource agencies. Funding for these management and maintenance activities will be covered by the mitigation site's endowment fund.

General Inspections: The resource manager(s) will conduct two general site inspections each year. These inspections may take place while conducting other routine site maintenance visits. Photo documentation will be collected. Permanent photo points for taking photographs will be established, and a site map showing the photo point will be prepared for the mitigation project file. Representative photographs will be taken once per year during the same season.

Mosquito Abatement: Potential mosquito abatement issues will be addressed through the development of a plan by the resource manager(s) and the mosquito and vector control district in coordination with and approved by the appropriate resource agencies.

Trash and Trespass: At least once yearly trash will be collected and disposed within the mitigation site. Vandalism and trespass impacts will be repaired and rectified. Sources of trash and trespass will be monitored.

Non-native Invasive Species: The resource manager(s) will monitor and maintain control over non-native invasive species, including but not limited to noxious weeds, that diminish site quality for which the mitigation project was established. The mitigation site currently functions with a number of nonnative species, some of which have become naturalized. They are predominantly annual species that occur in grasslands. It is unreasonable to require or expect eradication of established nonnative species at the site. The required management of nonnative plants therefore will be limited to the management of newly introduced invasive species and controlling the spread of existing invasive species. Methods of removing or controlling these species are outlined below.

Hand/mechanical: Hand removal or use of small hand-powered or handheld equipment (such as a Weed Wrench or a chainsaw) always should be the preferred method of removing invasive species from the mitigation properties. If hand-removal methods are found ineffective, or the problem is too widespread for hand removal to be practical, mechanical methods (use of larger equipment with motors such as mowers) or biological controls as described below can be used.

Biological controls: The county agricultural commissioner would be the point of contact for use of biological controls in the mitigation properties.

At no time will herbicides be utilized at the mitigation site.

Weeding will be done on an as-needed basis starting in March and ending in October.

Each year's annual walk-through survey (or a supplemental survey) will include a qualitative assessment (e.g., visual estimate of cover) of potential or observed noxious weeds or other non-native species invasions, primarily in or around the wetlands. Additional actions to control invasive species will be evaluated and prioritized.

Fire Hazard Reduction: Potential wildfire fuels will be reduced as needed by mowing in areas where approved by the resource agencies. The site will be maintained as required for fire control while limiting impacts to biological values. Vegetation will be mowed in areas required by authority agency(ies), and as approved by the appropriate resource agencies, for fire control.

Reporting and Administration

The resource manager(s) will provide an annual report on all management tasks conducted and general site conditions to appropriate resource agencies and any other appropriate parties. The annual report will be completed and circulated to the appropriate resource agencies and other parties by August 15 of each year. The report will make recommendations with regard to any habitat enhancement measures deemed to be necessary, any problems that need near short and long-term attention (e.g., weed removal, erosion control), and any changes in the monitoring or management program that appear to be warranted based on monitoring results to date.

10.2.5 Management Responsibilities and Plan Modification

Transfer of Management Responsibilities

Any subsequent transfer of management responsibilities under this long-term management plan to a different resource manager shall be requested in writing by the existing resource manager(s). The request shall be made to the appropriate resource agencies, which will issue written approval that shall be incorporated as an amendment into this long-term management plan. Any subsequent

property owner assumes resource manager responsibilities described in this long-term management plan and as required in the conservation easement, unless otherwise amended in writing by the appropriate resource agencies.

Amendment to Management Plan

The resource manager(s), property owner, and the resource agencies may meet and confer from time to time, upon the request of any one of them, to revise the long-term management plan to better meet management objectives and preserve the habitat functions and values of the mitigation site. Any proposed changes to the long-term management plan shall be discussed with the appropriate resource agencies and the resource manager(s). Any proposed changes will be designed with input from all parties. Amendments to the long-term management plan shall be approved by the appropriate resource agencies in writing and implemented by the resource manager(s).

10.2.6 Funding

Long-Term Funding Mechanism

An endowment will be provided by the implementing agency to CDFW who will hold the principal and interest monies as required by law in a deposit fund, or subsequent state authorized trustee fund which consists of monies that are paid into it in trust pursuant to law, and will be appropriated to fulfill purposes for which payments into it are made. These interest monies will fund the long-term management, enhancement and monitoring activities set forth by the conservation easement and consistent with this long term management plan.

The resource manager(s) shall consult with CDFW as required to determine the amount of funding available for management and monitoring activities.

10.2.7 Long-Term Conservation Mechanism

Conservation Easement

Conservation easements will be created for the portion of the SBCA owned by LD, and the entire FRFCRP site. They will act as a legal binding agreement to restrict the use of the parcel for the purpose of conserving in perpetuity the mitigated natural resources. The conservation easement will be attached to the property's fee title and apply to present and all future owners and resources managers of the mitigation site should LD1 relinquish or transfer land management responsibilities.

Chapter 11
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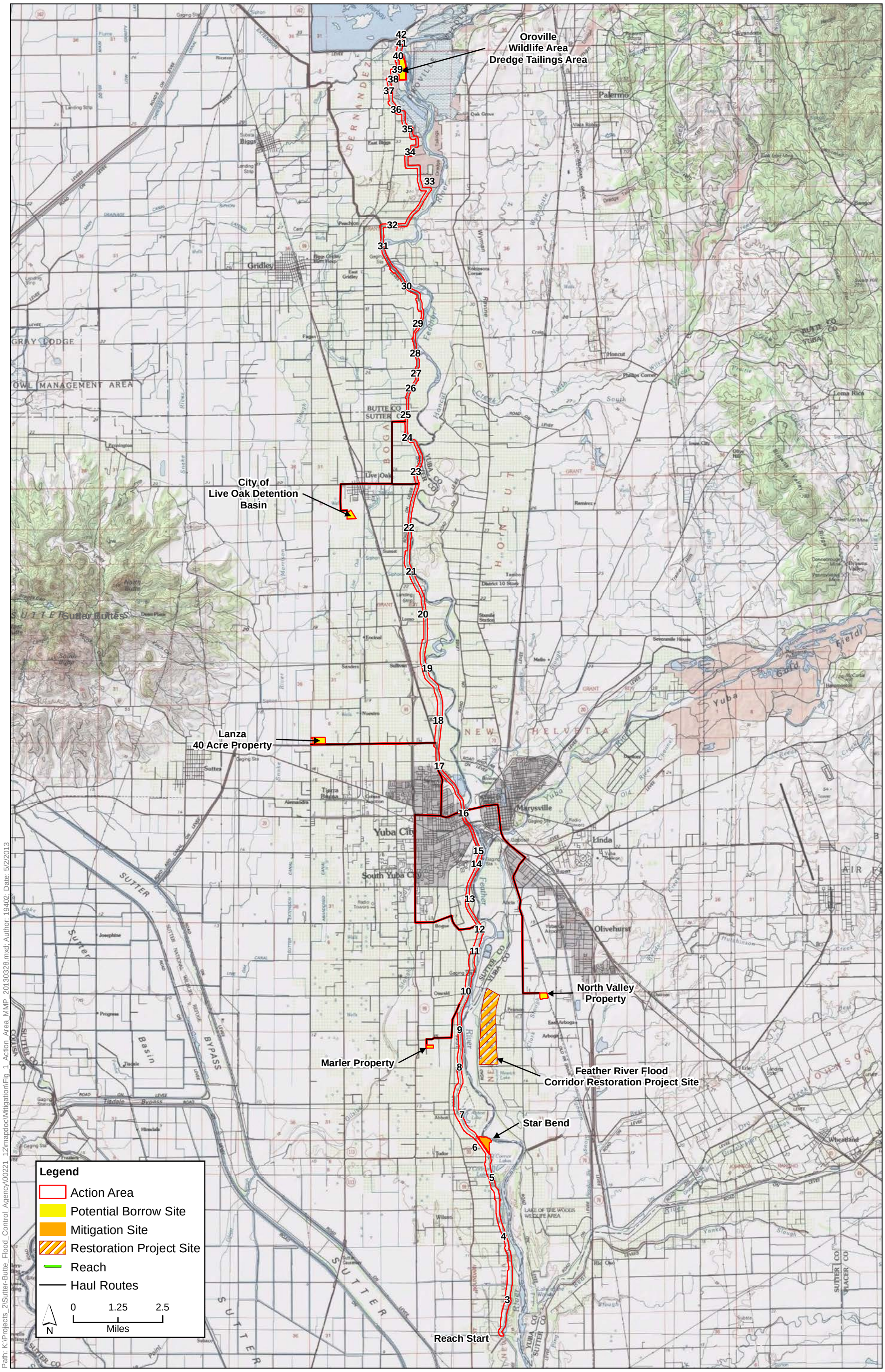

Figure 1
Feather River West Levee Project Action Area

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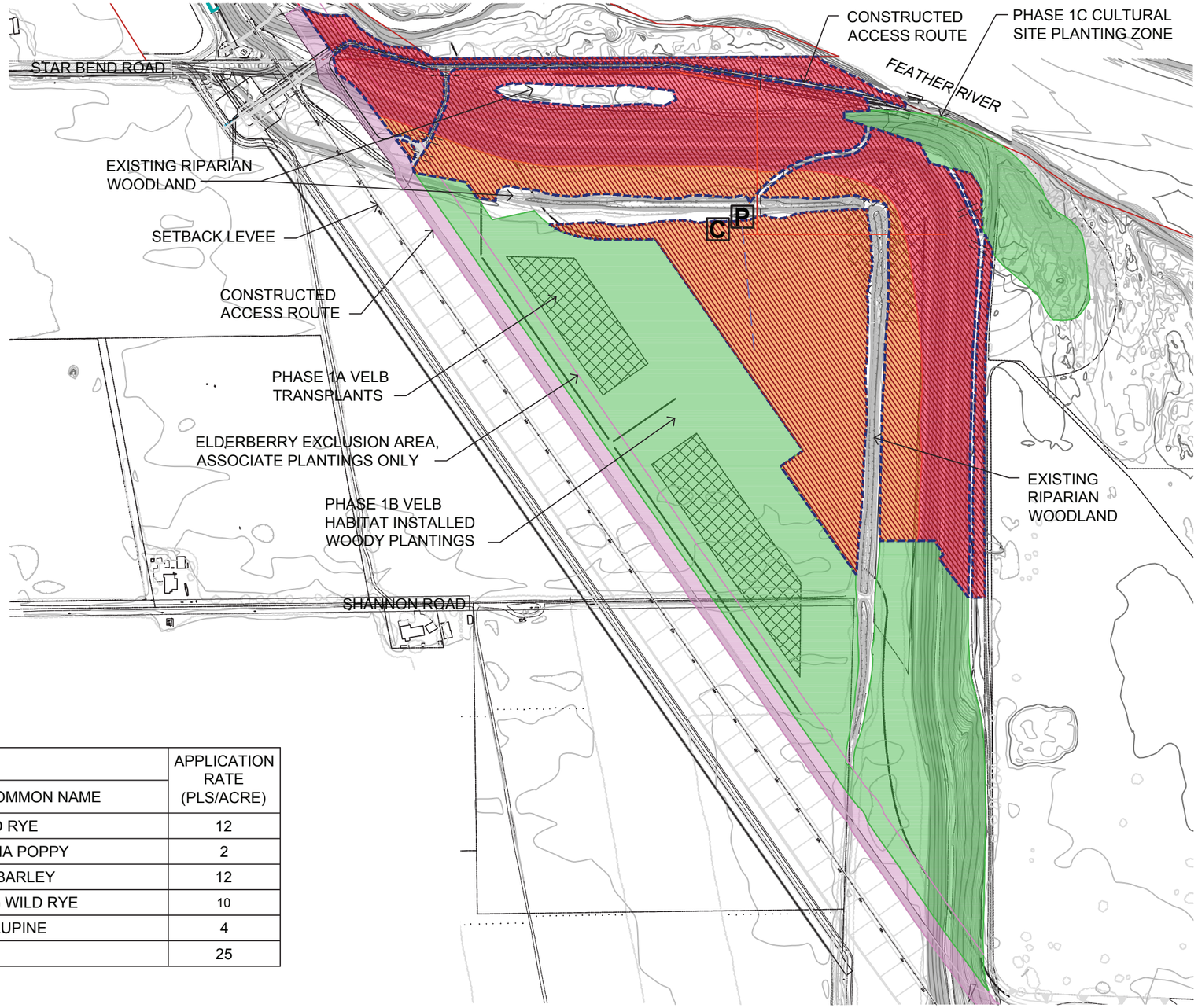
Figure 2
Star Bend Conservation Area

Legend:

- Protection Fencing
- Area of Levee Grading Disturbance
- Area of Mitigation Disturbance
- 50' Vegetation Planting Exclusion Area
- Star Bend Mitigation and Enhancement Habitat Phase 1
- Star Bend Elderberry Mitigation and Enhancement Habitat Phase 2 (11.40 acres)
  (Planting rows 10' apart, plants spaced per Restoration Planting Program)
- Star Bend Riparian and Non-Riparian Native Trees Mitigation and Enhancement Habitat Phase 2 (13.15 acres)
  (Planting rows 10' apart, plants spaced per Restoration Planting Program)
- P — Existing Well Pump with Filter, 6CLC 2 Stage Goulds Pump 7.5HP 230 Volt 3 Phase Motor Smartflow 7.5 HP VFD with 900 Series Tornado Filter
- C — Existing Irrigation Controller, Hunter ACC-1200 Controller, Mounted in lockable box adjacent to electric sub-panel
- Existing Mainline Pipe, 4" SCH 40 PVC, On-Grade
- New Mainline Pipe, 4" SCH 40 PVC, On-Grade
- New Mainline Pipe, 4" SCH 40 PVC, Below-Grade
- Sleeve, SCH 40 PVC, Below-Grade



RESTORATION SEED MIX

PLANTING ZONE	SPECIES NAME		APPLICATION RATE (PLS/ACRE)
	BOTANICAL NAME	COMMON NAME	
UPLAND SEED MIX	ELYMUS GLAUCUS	BLUE WILD RYE	12
	ESCHSCHOLIZIA CALIFORNICA	CALIFORNIA POPPY	2
	HORDEUM BRACHYANTHERUM	MEADOW BARLEY	12
	LEYMUS TRITICOIDES	CREEPING WILD RYE	10
	LUPINUS SUCCULENTUS	ARROYO LUPINE	4
	TRITICUM X ELYMUS	REGREEN	25

Graphics... 00120.13 (5/20/13) AB

Figure 3
Star Bend Conservation Area
Conceptual Planting Plan

RESTORATION PLANTING PROGRAM

PLANTING ZONE	SPECIES NAME		AVERAGE PLANT SPACING (FEET ON CENTER)	PERCENTAGE OF PLANT PALETTE	CONTAINER SIZE
	BOTANICAL NAME	COMMON NAME			
ELDERBERRY MITIGATION AREA	BACCHARIS PILULARIS	COYOTE BUSH	10' O.C.	10	1 GALLON
	POPULUS FREMONTII	FREMONT COTTONWOOD	10' O.C.	10	1 GALLON
	ROSA CALIFORNICA	CALIFORNIA WILD ROSE	10' O.C.	10	1 GALLON
	QUERCUS LOBATA	VALLEY OAK	10' O.C.	10	1 GALLON
	SALIX EXIGUA	SANDBAR WILLOW	10' O.C.	5	1 GALLON
	SALIX LASIOLEPIS	ARROYO WILLOW	10' O.C.	5	1 GALLON
	SAMBUCUS MEXICANA	MEXICAN BLUE ELDERBERRY	10' O.C.	50	1 GALLON
	TOTAL PLANT PALETTE FOR ELDERBERRY MITIGATION AREA =			100	
RIPARIAN MITIGATION AREA	ACER NEGUNDO	BOX ELDER	10' O.C.	15	1 GALLON
	CEPHALANTHUS OCCIDENTALIS	BUTTONWILLOW	10' O.C.	15	1 GALLON
	FRAXINUS LATIFOLIA	OREGON ASH	10' O.C.	10	1 GALLON
	PLATANUS RACEMOSA	CALIFORNIA SYCAMORE	12' O.C.	10	1 GALLON
	POPULUS FREMONTII	FREMONT COTTONWOOD	12' O.C.	10	1 GALLON
	QUERCUS LOBATA	VALLEY OAK	12' O.C.	5	1 GALLON
	ROSA CALIFORNICA	CALIFORNIA WILD ROSE	2' O.C. WITHIN CLUSTERS OF 5, 15' O.C. BETWEEN CLUSTERS	10	1 GALLON
	RUBUS URSINUS	CALIFORNIA BLACKBERRY	2' O.C. WITHIN CLUSTERS OF 5, 15' O.C. BETWEEN CLUSTERS	10	1 GALLON
	SALIX EXIGUA	SANDBAR WILLOW	10' O.C.	5	1 GALLON
	SALIX LASIOLEPIS	ARROYO WILLOW	10' O.C.	10	1 GALLON
	VITIS CALIFORNICA	CALIFORNIA WILD GRAPE	2' O.C. WITHIN CLUSTERS OF 5, 15' O.C. BETWEEN CLUSTERS	5	1 GALLON
	TOTAL PLANT PALETTE FOR RIPARIAN MITIGATION AREA =			100	
NON-RIPARIAN NATIVE TREE MITIGATION AREA	BACCHARIS PILULARIS	COYOTE BUSH	10' O.C.	15	1 GALLON
	QUERCUS LOBATA	VALLEY OAK	10' O.C.	75	1 GALLON
	QUERCUS WISLIZENII	INTERIOR LIVE OAK	10' O.C.	10	1 GALLON
	TOTAL PLANT PALETTE FOR NON-RIPARIAN NATIVE TREE MITIGATION AREA =			100	

NOTES:

1. IRRIGATION IS NECESSARY FOR PLANT SURVIVAL AND ESTABLISHMENT. IRRIGATION WILL BE APPLIED TO ACHIEVE SELF-SUFFICIENT PLANTS BY THE END OF THE THIRD DRY SEASON.
2. THE IRRIGATION SYSTEM WILL UTILIZE WELLS AND INFRASTRUCTURE ESTABLISHED IN PHASE 1.
3. SOIL MOISTURE PROBES WILL BE USED TO MONITOR AND MAINTAIN MOISTURE THROUGHOUT THE SOIL COLUMN. DEEP ROOTING WILL BE ENCOURAGED THROUGH DEEP WATERING WITH DIMINISHING FREQUENCY.
4. STAR BEND MITIGATION AND ENHANCEMENT HABITAT PHASE 2 IS COMPRISED OF 11.40 ACRES OF ELDERBERRY MITIGATION AND 13.15 ACRES OF RIPARIAN AND NON-RIPARIAN NATIVE TREE MITIGATION FOR A TOTAL OF 24.55 ACRES OF MITIGATION. AN ADDITIONAL 11.86 ACRES OF RIPARIAN AND NON-RIPARIAN NATIVE TREE MITIGATION WILL BE REQUIRED AT ANOTHER MITIGATION SITE TO BE DETERMINED.

Figure 4
Star Bend Conservation Area
Conceptual Planting Plan

SUTTER BASIN PILOT FEASIBILITY STUDY DRAFT COST EFFECTIVENESS INCREMENTAL COST ANALYSIS REPORT

PREPARED FOR:

U.S. Army Corps of Engineers
1325 J Street
Sacramento, CA 95814
Contact: Matt Davis
916.557.6708

PREPARED BY:

ICF International
630 K Street, Suite 400
Sacramento, CA 95814
Contact: Carl Jensen
916.737.3000

March 2013

ICF International. 2013. Sutter Basin Pilot Feasibility Study Draft Cost Effectiveness and Incremental Cost Analysis Report. (ICF 00165.12) Sacramento, CA. Prepared for U.S. Army Corps of Engineers, Sacramento, CA.

Contents

List of Tables and Figures

Tables

List of Acronyms and Abbreviations

CE/ICA	cost-effectiveness/incremental cost analysis
DFW	California Department of Fish and Wildlife
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
MMP	Mitigation and Monitoring Plan
Project	Feather River West Levee Project applicant-preferred alternative
SBFCA	Sutter Butte Flood Control Agency

Draft Sutter Basin Pilot Feasibility Study
Cost Effectiveness and Incremental Cost Analysis

Analysis Scope and Objective

This document is a cost effectiveness incremental analysis of the options for mitigating habitat and jurisdictional waters impacts associated with the SB 8 alternative and Sutter Butte Flood Control Agency's (SBFCA's) Feather River West Levee Project applicant-preferred alternative (Project).

For the purpose of this analysis, the two alternatives are treated the same because they are nearly perfectly congruent in construction footprint and activity, with the exceptions that SB 8 extends slightly farther to the south and has minor variations in staging and borrow areas. The difference in the southern limit is considered scalable between the two alternatives and would not represent different effect types, relative effect magnitude, or mitigation options. The differences in the staging and borrow areas is considered insignificant to this analysis because resultant habitat effects would be predominantly temporary and would not require habitat mitigation. Therefore, these differences are not discussed further in this analysis.

This analysis in presented in compliance with ER 1105-2-100 (April 22, 2000) and its included guidance on cost-effectiveness/incremental cost analysis (CE/ICA). It is intended to determine the least-cost solution for habitat mitigation for the project.

Project Description, Impacts, and Mitigation Needs

The project consists of levee improvements in a 41-mile corridor along the west levee of the Feather River from the Thermalito Afterbay downstream to approximately 3 miles north of the confluence with the Sutter Bypass. The levee improvements include mostly slurry cutoff walls with short segments of seepage berms and other location-specific measures like removal or treatment of encroachments.

Potential borrow sites that could supply the soil borrow material necessary for levee construction and upgrades, and routes from the project construction area to the borrow sites, are also included as part of the work. It is not anticipated that all sites would be used over the multi-year phased construction period but would be available for use if the need arises.

Existing Ecological Resources

Table 1 provides a summary of all existing land cover types within the Project area.

Table 1. Acreages of Existing Land Cover Types in the Project Area

Land Cover Type	Permanent Impacts for Which Mitigation Is Required?	Unit	Levee Construction Footprint [a]	Borrow Sites[a]	Total
Terrestrial					
Riparian Forest	Y	acre	252.71	9.97	262.68
Oak woodland	Y	acre	0.35	0	0.35
Orchard	N	acre	1212.89	0	1212.89
Field and row crops	N	acre	147.65	50.59	198.24
Wet agriculture (rice)	N	acre	0	348.08	348.08
Developed	N	acre	404.68	20.94	425.62
Ruderal	N	acre	903.24	82.96	986.20
Aquatic					
Freshwater emergent wetland	N	acre	0.57	0	0.57
Seasonal wetland	Y	acre	12.23	0	12.23
Open water	Y	acre	59.32	4.7	64.02
Tailing ponds	Y	acre	6.44	3.59	10.03
Stream	N	acre	0.17	0	0.17
Canal/ditch	Y	acre	22.51	0.64	23.15
Wet agriculture (rice)	N	acre	0	35.74	35.74

[a] Accuracy to 0.01 acre is subject to ±5% accuracy depending upon the accuracy of aerial imagery and topographic maps.

Significant Losses to Ecological Resources, Impact Units and Proposed Mitigation

Detailed discussion of the project impacts may be found in the Project's Environmental Impact Report/Supplemental Environmental Impact Statement (EIR/SEIS). Table 2 summarizes the project's impacts to sensitive ecological resources, impact unit of measure, and the proposed compensatory mitigation ratios and quantities.

Table 2. Anticipated Project Impacts to Sensitive Resources and Proposed Compensatory Mitigation

Impact Type	Impact Unit	Impact Quantity	Mitigation Need	Mitigation Area
Riparian Forest and Riparian Scrub Shrub	acres of cover type	42.50 acres	85.00 acres (2:1 replacement ratio[1])	85.00 acres at 10' o.c. plant spacing
Oak Woodland	acres of cover type	1.30 acres	2.60 (2:1 replacement ratio1[1])	2.60 acres at 10' o.c. plant spacing
Elderberry	individual shrubs and total stem count within each shrub	162 shrubs with 972 total stems	162 transplants, 2,466 elderberry seedlings, and 2,466 native associates	20.38 acres [2] (493 elderberry units)
Giant Garter Snake	acres of permanent impact	0.00 aquatic 3.54 acres upland	3.54 acres (3:1 replacement ratio[3])	10.62 acres
Jurisdictional Waters	acres of permanent impact	1.71 acres	3.42 acres (2:1 replacement ratio1[1])	3.42 acres

Notes:

1 Compensation ratio from USFWS Draft Fish and Wildlife Coordination Act Report.

2 Compensation acreage determined based on USFWS VELB Compensation Guidelines.

3 Compensation ratio from USFWS Programmatic Biological Opinion (U.S. Fish and Wildlife Service 1997)

Mitigation Planning Objectives and Potential Mitigation Strategies

The mitigation planning objective for this project is to provide compensatory mitigation at resource agency approved ratios for all permanent impacts to sensitive ecological resources.

There were four primary habitat mitigation solutions considered, listed below with a statement of applicability.

- **In-lieu fee program.** This option, wherein a permittee/applicant pays the permitting agency to implement mitigation at its discretion, generally has low favorability with the agencies requiring mitigation because it shifts the burden of responsibility for providing replacement habitat from the applicant/permittee to the permitting agency. It is often regarded as a "last resort" and typically applies only to very small projects and impacts where other mitigation options may not be feasible, upon negotiation with the permitting agency. Approved in-lieu fee programs may not exist for all mitigation needs in the project area. For this combination of reasons, in-lieu fee programs were not considered further as a viable solution for this project.
- **Out-of-kind replacement habitat.** This option involves replacement of habitat with a different type than that which was impacted, either on-site or off-site. Because in-kind replacement habitat is not feasible, this option was not considered further as a viable solution for this project.

- **On-site replacement habitat.** This option involves replacement of affected habitat with new habitat of the same type and at the same location as the loss. Because much of the affected habitat (specifically, woody vegetation) is not compliant in its location with USACE levee vegetation policy, this option is not considered feasible. Further, the highly dispersed nature of the impact locations makes efficient replacement infeasible. On-site replacement was not considered further as a viable option for this project.
- **Off-site, in-kind replacement habitat.** This option involves replacement of affected habitat with new habitat of the same type but at a different location than the loss. This often allows for consolidation of mitigation at a single or small number of sites, allowing for economy of scale and higher quality habitat due to large patch size. There are two sub-types:
    - **Permittee-responsible mitigation.** This option involves replacement of in-kind habitat on habitat lands operated by the permittee. Permittee-responsible mitigation is considered viable and is addressed in the Mitigation and Monitoring Plan (MMP) developed for the project.
    - **Purchase of credits at commercial mitigation banks.** This option involves replacement of in-kind habitat through purchase of credits issued for habitat lands operated by a commercial mitigation bank. Purchase of credits is considered viable and is addressed in the MMP developed for the project.

Permittee-Responsible Mitigation. Permittee-responsible offsite mitigation involves securing an appropriate mitigation site, implementing the mitigation plan, monitoring its performance, maintaining the site during the establishment period, developing a conservation mechanism, and arranging a source of funding for long-term protection of the site.

The Star Bend and TRLIA Feather River mitigation sites are existing floodplain habitat restoration sites that were created as part of the Star Bend setback levee and Feather River setback levee projects, respectively. Together, both sites contain sufficient area to accommodate all of the project's upland compensatory mitigation, consisting of mostly woody vegetation. Aquatic habitat mitigation, including giant garter snake habitat and jurisdictional waters, could be created through restoration of a rice field used for soil borrow for the project.

Table 3 provides a summary of the permittee-responsible mitigation and the anticipated costs. Appendix 1 contains detailed construction and establishment cost breakdowns for each category to establish a unit cost for equitable comparison between mitigation solutions (i.e., "apples-to-apples" comparison).

Table 3. Permittee-Responsible Mitigation Costs

Mitigation Type	Location	Quantity	Unit	Cost per Unit	Cost
Oak Woodland	Star Bend	1.30	Acres	$36,684	$47,689
Oak Woodland	TRLIA Feather River	1.30	Acres	$36,684	$47,689
Elderberry (New Plantings)/Riparian Forest Mitigation[1]	Star Bend	493	Units	$1,488	$733,584
Riparian Forest	Star Bend	4.12	Acres	$35,855	$147,722
Riparian Forest	TRLIA Feather River	60.50	Acres	$35,855	$2,169,228
Elderberry (Transplants)	Star Bend	162	Each	$1,200	$194,400
Giant Garter Snake	Restored rice field	10.62	Acres	$40,291	$427,890
Jurisdictional Waters	Restored rice field	3.42	Acres	$164,167	$561,452
				Total	**$4,329,654**

1 Riparian forest mitigation can be met through elderberry mitigation.

Mitigation Bank. Purchase of mitigation bank credits involves utilizing a commercial mitigation bank or banks to fulfill the project's compensatory mitigation obligation. The mitigation bank or banks would need to have been approved by the permitting agencies for the habitat types and service area that covers the impact.

Currently there is not one mitigation bank that can solely fulfill all of the credit types needed for the project's mitigation requirements. For the upland habitat impacts, the River Ranch Elderberry Conservation Bank, owned and operated by Wildlands, Inc., is located at the confluence of the Sacramento and Feather Rivers in Yolo County. This bank can fulfill the riparian and elderberry mitigation requirements of the project. There are currently no mitigation banks that offer oak woodland (non-riparian native tree) credits.

For the aquatic habitat impacts, the Sutter Basin Conservation Bank, owned and operated by Westervelt Ecological Services in Sutter County, is the only bank that presently offers giant garter snake credits approved by both the U.S. Fish and Wildlife Service and California Department of Fish and Wildlife (DFW). Jurisdictional water credits are available at the River Ranch Wetland Mitigation Bank (discussed above).

Table 4 provides a summary of the agency-approved mitigation credits available at the banks in the service area of the impacts.

Table 4. Mitigation Bank Costs

Mitigation Type	Location	Quantity	Unit	Cost per Unit	Total
Oak Woodland	None	2.60	Acres	$50,000[1]	$130,000
Elderberry (New Plantings) and Riparian Forest Mitigation[2]	River Ranch Elderberry Conservation Bank	493	Units	$4,000	$1,972,000
Riparian Forest		64.62	Acres	$100,000	6,462,000
Elderberry (Transplants)		162	Each	$1,200	$194,400
Giant Garter Snake	Sutter Basin Conservation Bank	10.62	Acres	$40,000	$424,800
Jurisdictional Waters	River Ranch Wetlands Mitigation Bank	3.42	Acres	$100,000	$342,000
				Total	**$9,525,200**

[1]Estimate; no market credits are available at this time.

[2]Riparian forest mitigation can be fulfilled through purchase of elderberry credits

Summary of Results

The total cost for the permitted responsible mitigation option is $4,329,654. The total cost for the mitigation bank option is $9,525,200. On a cost per unit basis, the most cost-effective solution would be a blend between the two options, as shown below in Table 5.

Table 5. Unit Cost Comparison

Mitigation Type	Unit	Permittee-Responsible Mitigation Cost per Unit	Mitigation Bank Cost per Unit	Most Cost-Effective Solution
Oak Woodland	acre	$36,684	$50,000*	Permittee-responsible
Elderberry (New Plantings)/Riparian Tree Mitigation	unit	$1,488	$4,000	Permittee-responsible
Elderberry (Transplants)	each	$1,200	$1,200	Permittee-responsible/Mitigation bank
Giant Garter Snake	acre	$40,291	$40,000	Mitigation bank
Jurisdictional Waters	acre	$164,167	$100,000	Mitigation bank

*Estimate; no market credits are available at this time.

Therefore, in accordance with ER 1105-2-100 (Appendix E, page 153), the most cost-effective plan is a combination of permittee-responsible mitigation and purchase of credits at a commercial mitigation bank, as no other plan costs less, and no other plan yields more output for less money.

This blended solution is detailed in Table 6. The total compensation cost using this solution is about $4.6 million.

Table 6. Most Cost-Effective Mitigation Solution

Mitigation Type	Location	Quantity/ Unit	Cost per Unit	Total
Oak Woodland	Star Bend or TRLIA Feather River	2.6 acres	$36,684	$95,378
Elderberry (New Plantings)/Riparian Tree Mitigation	Star Bend	493 units	$1,488	$733,584
Elderberry (Transplants)		162 each	$1,200	$194,400
Riparian Forest	Star Bend or TRLIA Feather River	4.12 acres	$35,855	$147,722
Riparian Forest	TRLIA Feather River	60.50 acres	$35,855	$2,169,228
Giant Garter Snake	Sutter Basin Conservation Bank	22.5 acres	$40,000	$900,000
Jurisdictional Waters	River Ranch Wetlands Mitigation Bank	3.42 acres	$100,000	$342,000
Total				**$4,582,312**

There are other factors influencing favorability of this blended solution. One such factor is that oak woodland mitigation is not presently available at a bank, meaning a bank-only solution is not feasible. Moreover, enhancement of the Star Bend restoration area is favored by the permitting agencies to more fully realize the floodplain habitat potential for this area for fish and wildlife. Additionally, the Star Bend site is under joint control by one of SBFCA's member agencies (Levee District 1) and CDFW, easing issues with maintenance, ownership, and protective status in conservation. Conversely, these issues are not resolved for a permittee-responsible aquatic mitigation site, increasing the favorability of mitigation bank solution for these impacts.

Nearly half ($2.4 million) of the total mitigation cost of 4.6 million is endangered species compensation. The remainder is primarily compensation for loss of riparian forest. Riparian forest is a significant resource based on scarcity, institutional and public significance criteria. It is estimated that 95 percent of pre-European acres of riparian habitat in California's Central Valley have been lost to recent human activities.

An incremental cost analysis was not performed because there were no breakpoints where the incremental cost per unit changed dramatically with increasing cost and where less than full compensation for riparian forest may be justified based on incremental costs. In part, this was a result of using acres of habitat rather than habitat units as the output metric to compare measures.

More detailed analyses using habitat based modeling methods such as Habitat Evaluation Procedures may be performed during future design phases to ensure that significant habitat function and values are compensated for and the most cost effective and incrementally justified solution is identified.

Appendix A
Mitigation Cost Tables

Table A1. Elderberry Mitigation Costs at Star Bend

Habitat Feature	Task Description	Unit	Unit Cost	Quantity	Total Cost	Assumptions
Elderberry plantings at Star Bend (20.38 acres)	Mobilization	LS	$15,000	1	$15,000	
	Container plant	EA	$20	4,932	$98,640	Assumes 5 elderberry and 5 associates per unit (242 plants/acre)
	Irrigation system	AC	$8,500	20.38	$173,230	Assumes flood proof drip system
	Irrigation POC	EA	$15,000	1	$5,000	Assumes pumping ou of Feather River
	Maintenance Years 1-4	LS	$42,298	1	$107,462	Assumes 20% morality for Years 1-3 and 10% for Year 4
	Monitoring Years 1-10	LS	$92,400	1	$160,000	
	15% Contingency				$83,548	
	Total				**$642,880**	

Table A2. Non-Riparian Native Tree Mitigation Costs at Star Bend and TRLIA Feather River

Habitat Feature	Task Description	Unit	Unit Cost	Quantity	Total Cost	Assumptions
Oak plantings at Star Bend and TRLIA Feather River (20.14 acres)	Mobilization	LS	$15,000	2	$30,000	
	Container plant	EA	$20	10,180	$203,600	Assumes 10' O.C. spacing
	Acorn plantings	EA	$3	10,120	$30,360	Assumes 500 acorns/acre
	Irrigation system	AC	$8,500	20.14	$171,190	Assumes flood proof drip system
	Irrigation POC	EA	$15,000	1	$15,000	Assumes utilizing existing well
	Maintenance Years 1-4	LS	$107,462	1	$107,462	Assumes 20% morality for Years 1-3 and 10% for Year 4
	Monitoring Years 1-10	LS	$84,000	1	$84,000	
	15% Contingency				$97,203	
	Total				**$738,815**	

Table A3. Riparian Mitigation Costs at Star Bend

Habitat Feature	Task Description	Unit	Unit Cost	Quantity	Total Cost	Assumptions
Riparian plantings at Star Bend (9.51 acres)	Mobilization	LS	$15,000	1	$15,000	
	Container plant	EA	$20	4783	$95,660	Assumes 10' O.C. spacing
	Irrigation system	AC	$8,500	9.51	$80,835	Assumes flood proof drip system
	Maintenance Years 1-4	LS	$16,657	1	$67,887	Assumes 20% morality for Years 1-3 and 10% for Year 4
	Monitoring Years 1-10	LS	$13,950	1	$37,200	
	15% Contingency				$44,475	
	Total				$340,977	

Table A4. GGS Mitigation at Generic Permittee-Responsible Site

Habitat Feature	Task Description	Unit	Unit Cost	Quantity	Total Cost	Assumptions
GGS (7.5 acres aquatic and 15 acres upland)	Land cost	AC	$7,500	22.5	$168,750	
	Mobilization	LS	$15,000	1	$15,000	
	Grading	CY	$4	36,300	$145,200	Assumes 3' of cut over 7.5 acres and on-site spoils disposal
	Seeding	AC	$1,000	22.5	$22,500	Assumes seeding over all 22.5 acres
	Planting	EA	$3	15,090	$45,270	Assumes plug planting at 5' O.C. over 7.5 acres
	Erosion control	LS	$5,000	1	$5,000	
	Design and permitting	LS	$46,594	1	$46,594	Assumes 20% of construction costs
	GGS monitoring	YR	$8,000	5	$40,000	
	Endowment	LS	$300,000	1	$300,000	Assumes $6,000/year for long term maintenance and monitoring at 2% annual return on principal
	15% Contingency				$118,247	
	Total				**$906,561**	

Table A5. Jurisdictional Habitat Mitigation at Generic Permittee-Responsible Site

Habitat Feature	Task Description	Unit	Unit Cost	Quantity	Total Cost	Assumptions
Wetlands and waters (3.42 acres)	Land cost	AC	$7,500	6	$45,000	Assumes approximately 2.5 acres of upland for spoils disposal and buffer
	Mobilization	LS	$15,000	1	$15,000	
	Grading	CY	$4	16,552	$66,208	Assumes 3' of cut over 3.41 acres and on-site spoils disposal
	Seeding	AC	$1,000	6	$6,000	Assumes seeding over all 6 acres
	Planting	LS	$3	9,309	$27,927	Assumes plug planting at 5' O.C. over 3.42 acres
	Erosion control	LS	$5,000	1	$5,000	
	Design and permitting	LS	$24,027	1	$24,027	Assumes 20% of construction costs
	Wetland monitoring	YR	$12,000	5	$60,000	
	Endowment	LS	$200,000	1	$200,000	Assumes $4,000/year for long term maintenance and monitoring at 2% annual return on principal
	25% Contingency				$112,290	
	Total				**$561,452**	

PROGRAMMATIC AGREEMENT
AMONG
THE U.S. ARMY CORPS OF ENGINEERS AND
THE CALIFORNIA STATE HISTORIC PRESERVATION OFFICER,
REGARDING
THE SUTTER BASIN FEASIBILITY STUDY

WHEREAS, the U. S. Army Corps of Engineers, Sacramento District (Corps), is proceeding with the Sutter Basin Feasibility Study, and the Corps has determined that the study and subsequent approved project alternatives (Project) constitute an Undertaking as defined in the Advisory Council on Historic Preservation Procedures 36 CFR § 800.16(y); and

WHEREAS, the purpose of the Sutter Basin Feasibility Study is to address Flood Risk Management in conjunction with Ecosystem Restoration and Recreation. The study area is located in Sutter and Butte Counties California and is roughly bounded by the Feather River, Sutter Bypass, Wadsworth Canal, Sutter Buttes, and Cherokee Canal. The study area covers approximately 300 square miles and is approximately 43 miles long and 9 miles wide. The study area includes the communities of Yuba City, Live Oak, Gridley, Biggs, and Sutter. A map of the study area is included as Appendix 1 to this Programmatic Agreement (PA).

WHEREAS, the Undertaking is authorized under the Flood Control Act of 1962 (Public Law 87-874), that provides the Corps the authority to study flood risk management and related water resources problems in the Sacramento River Basin, including the study area in Sutter and Butte Counties; and

WHEREAS, The Corps has determined that effects on properties that are either included in, or are eligible for inclusion in the National Register of Historic Places (NRHP) cannot be fully determined prior to completion of the Sutter Basin Feasibility Study and selection of approved alternatives; this agreement addresses all phases and segments of the Project; and

WHEREAS, the Corps has consulted with the California State Historic Preservation Officer (SHPO) and offered the Advisory Council on Historic Preservation (ACHP) the opportunity to consult pursuant to Section 106 of the National Historic Preservation Act of 1966 (Section 106), and the implementing regulations described under 36 CRF Part 800; and

WHEREAS, by letter dated March 13, 2012, the ACHP declined to participate in the consultation.

WHEREAS, the Corps has consulted with the non-Federal cost-sharing agencies, the Sutter Butte Flood Control Agency and the Central Valley Flood Protection Board, and has invited them to participate as concurring parties; and

WHEREAS, the Corps has contacted the Mechoopda Indian Tribe of Chico Rancheria, the Greenville Rancheria of Maidu Indians, the Maidu Nation, the Butte Tribal Council, the Mooretown Rancheria of Maidu Indians, the United Auburn Indian Community of the Auburn Rancheria, the Maidu Cultural and Development Group, the KonKow Valley Band of Maidu, the T'Si-akim Maidu, the Strawberry Valley Rancheria, the Berry Creek Rancheria of Maidu Indians, the Enterprise Rancheria of Maidu Indians, and other Native individuals; and invited them to consult on this agreement; and

WHEREAS, the Corps has consulted with the United Auburn Indian Community of the Auburn Rancheria, the Estom Yumeka Maidu Tribe of the Enterprise Rancheria, and the Mechoopda Indian Tribe

of Chico Rancheria who have indicated their interest in participating in this agreement and are invited to participate as concurring parties; and

WHEREAS, the definitions set forth in 36 CFR § 800.16, with amendments effective August 5, 2004, are incorporated herein by reference and apply throughout this PA;

NOW, THEREFORE, the Corps and the SHPO agree that the proposed undertaking shall be implemented in accordance with the following stipulations in order to take into account the effects of the undertaking on historic properties and to satisfy the Corps' Section 106 responsibilities for all individual aspects of the undertaking.

STIPULATIONS

The Corps shall ensure that the following measures are carried out:

Stipulation I
Professional Qualification

The Corps shall ensure that historic, architectural, and archaeological work conducted pursuant to this agreement is carried out by, or under the direct supervision of, a person or persons who meet the qualifications set by the Secretary of the Interior for Archaeology and Historic Preservation under 36 CFR Part 61.

Stipulation II
Area of Potential Effects

A. Should the Corps determine that an undertaking is warranted and alternatives are defined, the Corps shall define and document the area of potential effects for all defined alternatives (APE) in consultation with SHPO. If future project design requires redefining the APE, the Corps shall consult with SHPO in a timely manner to amend the APE.

B. The APE shall include the footprint of all construction activities, staging areas, haul roads, and mitigation sites. The APE may also include sensitive structures within range of vibratory or sonic disturbances, and historic properties and districts close enough to project construction that the integrity of their setting or feeling could be affected.

C. The APE may include portions of the study area indicated on the map included as Appendix 1.

Stipulation III
Identification and Evaluation

A. The study is intended to determine the feasibility of a federal action. In the course of making that determination the Corps shall consider the probability of an action effecting historic properties by consulting with Native American groups and reviewing pertinent archaeological records and literature.

B. The Corps shall acquire a current and complete records and literature search from the Northeast Information Center at California State University, Chico prior to conducting archaeological surveys of the

APE. Records and literature searches shall be considered complete and current for a period of three years after they are conducted unless, in the professional opinion of Corps archaeologists, more frequent updates are required.

C. The Corps shall consult with Native American groups and individuals, identified as described in Stipulation V (A), to identify properties that are of religious and cultural significance to them and that may be eligible for the National Register. Traditional Cultural Properties will be evaluated following the guidance presented in National Register Bulletin 38: *Guidelines for Evaluating and Documenting Traditional Cultural Properties*.

D. The Corps shall complete and report the results of all required cultural resources inventories of the undertaking's APE in a manner consistent with the "Secretary of the Interior's Standards and Guidelines for Identification" (48 FR 44720-23) and take into account the National Park Service's publication, "The Archeological Survey: Methods and Uses" (1978: GPO stock #024-016-00091). Inventories shall include both archaeological surveys and inventories of historic buildings, structures, and districts as appropriate. The Corps shall include a geoarchaeological evaluation of the APE in its survey and shall undertake subsurface reconnaissance as appropriate. Surveys shall include areas not previously surveyed and areas where the Corps, in consultation with SHPO, deems previous surveys to be inadequate. The Corps will also include additional areas that may be affected by changes in the project design, borrow areas, haul roads, staging areas, extra work space, mitigation sites, and other ancillary areas related to the undertaking. If identified cultural resources do not need to be evaluated but can be determined eligible based on the results of the survey, context statements, and historic documentation, then the Corps may request SHPO concurrence with those determinations at that time. The Corps shall submit reports produced as a result of intensive surveys to SHPO for review. The Corps shall deliver its submissions to the SHPO in the most expeditious manner possible: by electronic means such as email or fax; or hand delivery. SHPO shall have 15 calendar days after receipt to provide comments to the Corps.

E. The Corps shall include in its site recordation documents all unrecorded archaeological sites, linear features, and isolates encountered in the course of the survey. The Corps shall prepare updated records of previously recorded sites as necessary. The Corps' survey shall record all prehistoric sites and all historical sites, structures, buildings, and engineering features greater than forty-five (45) years of age. Historic sites to be recorded shall include, but not be limited to: commercial, residential, and ecclesiastical buildings, roads, trails, bridges, levees, culverts, and agricultural features, including ditches.

F. The Corps shall use the California Department of Parks and Recreation (DPR) form 523 to record all newly discovered historic or prehistoric archaeological sites and isolates, previously recorded archaeological sites, and where necessary, shall create updated site records using the DPR 523 form. Isolates shall be numbered sequentially, plotted on a map, and recorded on a single table within the report. The Corps shall examine non-linear sites that extend outside of the APE in their entirety unless access to land is prohibited or the scale of the resource makes doing so prohibitive. In the event access cannot be gained, the Corps shall consult with SHPO regarding appropriate means of evaluating a given site. The Corps shall record linear resources (i.e., railroad, road, trail, ditch, levee, etc.) that appear on GLO plat maps or are known from other archival data to be potentially significant, or which have associated features or dateable artifacts on DPR 523 site forms. The Corps will treat linear resources not mentioned on GLO plat maps or that appear on GLO plat maps but which are not associated with features or dateable artifacts, or do not otherwise appear to be significant on the basis of known archival data as "isolated feature segments" and shall record them in tabular form and shall include at a minimum a basic GPS map of the linear feature within the APE. Historic structures and buildings shall be recorded using the State Historic Preservation Office, Historic Resources Inventory form.

G. If the selected project alternative would involve impacts to Federal levees, the levees will be treated as though they were eligible for inclusion in the National Register of Historic Places or an Evaluation Plan (EP) will be developed to provide for consistent and thorough evaluation. If the Corps elects to prepare an EP, the analysis in the EP shall consider the levees in the context of the entire Feather River levee system. Additionally, the EP shall include clear and specific criteria for determining both (1) contributing and non-contributing elements of the levee system and (2) thresholds of adverse effect. Should the Corps, in consultation with the SHPO, determine that a given levee is eligible for the NRHP; a Historic Property Treatment Plan, as described unber Stipulation VI, shall be produced for that property.

H. The Corps shall ensure that EPs prepared for previously unevaluated cultural resources identified within the APE are consistent with the "Secretary of the Interior's Standards and Guidelines for Evaluation" (48 FR 44723-26). The Corps shall develop individual EPs to address different categories of potentially eligible historic properties. The Corps shall develop a Discovery Evaluation Plan (DEP) and a Construction Monitoring Plan (CMP) as components of an EP. An EP shall be used whenever the Corps, in consultation with the SHPO, determines that a cultural resource should be evaluated and use of the EP is essential to determine the boundaries and data potential of the site. If the Corps undertakes any archaeological testing, such testing shall be sufficient to define and delineate the site clearly, and to determine the site's eligibility for inclusion in the NRHP.

I. The Corps shall submit the EP for concurrent review to the SHPO and appropriate Native American groups. The Corps shall deliver its submissions in the most expeditious manner possible: by electronic means such as email or fax; or hand delivery. The Corps shall allow reviewers 30 calendar days after receipt to comment on the draft EP. The Corps shall ensure that any comments received within that time period are taken into account and incorporated into the final EP. If the Corps cannot concur with comments made by SHPO and/or Native American groups, the Corps will resolve the dispute in accordance with Stipulation XIII. Failure of the SHPO to comment within the specified time period shall not preclude the Corps from finalizing and implementing the draft EP. The Corps shall ensure that the SHPO is expeditiously provided with copies of the final EP.

J. The Corps and the SHPO may develop standard protection plans (SPP) for classes of resources that occur commonly in the APE and that may be encountered unexpectedly during construction. SPPs shall include a clear description of the class or classes of resources covered and the specific actions that the Corps will take to mitigate or avoid adverse effects to those resources.

K. The Corps shall submit all SPPs for concurrent review to the SHPO and appropriate Native American groups. Submissions shall be delivered in the most expeditious manner possible: by electronic means such as email or fax; or hand delivery. The Corps shall allow reviewers 30 calendar days after receipt to comment on the draft SPP. The Corps shall ensure that any comments received within that time period are taken into account and incorporated into the final SPP. If the Corps cannot concur with comments made by SHPO and/or Native American groups, the Corps will resolve the dispute in accordance with Stipulation XIII. Failure of the SHPO to comment within the specified time period shall not preclude the Corps from finalizing and implementing the draft SPP. The Corps shall ensure that the SHPO is expeditiously provided with copies of the final SPP.

L. The Corps, in consultation with SHPO, shall ensure that determinations of eligibility are made in accordance with the criteria set forth in 36 CFR §60.4 for all properties not covered by an SPP, within the APE, that would be affected by the Project; including additional areas that may be affected by changes in the project design, borrow areas, haul roads, staging areas, extra work space, mitigation sites, and other ancillary areas related to the undertaking. If the Corps and the SHPO cannot agree on the eligibility of a property for the NRHP, the Corps shall obtain a determination from the Keeper of the National Register

in accordance with 36 CFR Part 63. The determination of the Keeper shall be final for purposes of this PA. Any other disputes shall be settled following the procedure set forth under Stipulation XIII

Stipulation IV
Determinations of Effect

The Corps shall apply the Criteria of Adverse Effect pursuant to 36 CFR §800.5(a) (1) to all historic properties within the APE that will be affected by the Project. The Corps shall make determinations of effect in consultation with the SHPO and other interested parties. If the Corps determines that the project will result in no adverse effects to historic properties then the Corps may issue a notice to proceed with construction. If adverse effects are unavoidable, the Corps shall develop a Historic Properties Treatment Plan following the procedure set forth under Stipulations VI and VII.

Stipulation V
Non-Federal Stakeholder Involvement

A. The Corps will identify potentially interested Native American groups in consultation with the Native American Heritage Commission (NAHC). In consultation with appropriate Indian groups and the NAHC, the Corps will identify historic properties of traditional religious and cultural importance.

B. Following the guidance provided in National Register Bulletin 38, the Corps shall seek comments from all potentially interested Native American groups when making determinations of eligibility for any Traditional Cultural Properties.

C. The Corps has consulted with the Sutter Butte Flood Control Agency and the Central Valley Flood Protection Board in the development of this agreement. Both agencies are concurring parties and will be given the opportunity to comment on the identification and treatment of historic properties.

D. The Corps shall give members of the public an opportunity to comment on the identification and treatment of historic properties.

E. The Corps shall allow all reviewers 15 calendar days after receipt to provide comments to the Corps. The Corps shall ensure that any comments received during this time period are taken into account and incorporated into the final survey and evaluation reports. Disputes shall be resolved by the Corps in accordance with Stipulation XIII.

F. Pursuant to Section 36 CFR § 800.6(c)(2-3) of the ACHP's regulations, the Corps shall consider requests by consulting parties and others to become concurring parties to this Programmatic Agreement.

Stipulation VI
Preparation of Historic Property Treatment Plans

The Corps, in consultation with SHPO shall ensure that a Historical Property Treatment Plan (HPTP) is developed for the mitigation of anticipated effects on historic properties that will result from the Project. Further, the Corps, in consultation with SHPO, will ensure the development of location and property specific Data Recovery Plans.

A. Avoidance of adverse effects on historic properties is the preferred treatment approach. The

HPTP shall discuss and justify the chosen approaches to the treatment of project historic properties and those treatment options considered, but rejected. If preservation of part or all of any historic properties is proposed, the treatment plan shall include discussion of the following:

1. Description of the area or portions of the historic properties to be preserved in-place, and an explanation of why those areas or portions of sites were chosen;
2. Explanation of how the historic properties will be preserved in-place, including both legal and physical mechanism for such preservation;
3. A plan for monitoring and assessing the effectiveness of mechanisms to preserve the historic properties; and
4. A plan for minimizing or mitigating future adverse effects on the historic properties if preservation in-place mechanisms prove to be ineffective.

B. When avoidance is not feasible, the Corps, in consultation with the SHPO, shall ensure the development of an appropriate treatment plan designed to lessen or mitigate project-related effects to historic properties. For properties eligible under criteria described in 36 CFR §60.4(a) through (c), the Corps may consider mitigation other than data recovery in the treatment plan (e.g., HABS/HAER recordation, oral history, historic markers, exhibits, interpretive brochures or publications, etc.). Where appropriate, the Corps shall include provision in the treatment plans (content and number of copies) for a publication for the general public.

C. When data recovery is proposed, the Corps in consultation with the SHPO, shall ensure the development of a data recovery plan that is consistent with the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation and the ACHP's "Recommended Approach for Consultation on Recovery of Significant Information from Archaeological Sites" (ACHP June 17, 1999). Components to be included in research designs and data recovery plans are found in Appendicies 2 and 3 to this PA.

D. Each phase or segment specific treatment plan shall relate directly to the HPTP prepared for the project, providing specific direction for the conduct of data recovery within any project segment. Appendix 3 lists components to be included in data recovery plans.

E. The Corps shall invite the interested public, including Native American groups to provide input on the identification, evaluation, and proposed treatment of historic properties. The Corps shall involve the interested public through letters of notification, public meetings, and/or site visits as the Corps deems appropriate.

Stipulation VII
Review of Treatment Plan

The Corps shall ensure that draft HPTPs are submitted concurrently to the SHPO, the ACHP, and appropriate Native American groups and individuals for review and comment. The Corps shall allows reviewers 30 calendar days after receipt of the draft HPTP to provide comments to the Corps. The Corps shall ensure that any comments received during this time period are taken into account and incorporated into the final HPTP. In the event that disputes are not easily remedied, the Corps shall resolve them in accordance with Stipulation XIII. Failure to comment within this time period shall not preclude the Corps from finalizing and implementing the HPTP. The Corps shall ensure that all reviewers are expeditiously provided copies of the final HPTP.

A. If the Corps revises the HPTP, it shall allow any party, including the SHPO, 15 calendar days to review the revised HPTP. Failure of the SHPO to comment within the specified time period shall not preclude the Corps from finalizing and implementing the revised HPTP in accordance with the terms of this stipulation.

B. Once the reviewing parties determine that the HPTP is adequate, the Corps shall issue authorization to proceed with the implementation of the plans.

C. The Corps shall provide final drafts of the HPTP to SHPO and the ACHP.

Stipulation VIII
Modifications of Project Scope

A. Identification and Evaluation

1. If modification of the project scope becomes necessary or if activities are proposed in ancillary areas (AAs) such as borrow or disposal areas that have not been previously surveyed for historic properties, the Corps shall ensure that the APE, defined as described under Stipulation II (B), of the modified project or un-surveyed AA is inventoried. Any properties located within those modified APEs that may be affected by the undertaking shall be evaluated.

2. The Corps shall identify and evaluate such properties in the manner specified in Stipulations II through IV.

3. If the Corps discovers any historic properties eligible for listing on the NRHP in the modified APE, the Corps shall develop and implement a supplemental HPTP in the manner specified in Stipulations VI and VII.

B. The Corps may authorize construction in any area subject to the provisions of this stipulation after the Corps and the SHPO have consulted and agreed in writing that such construction either will not affect historic properties, or that the area does not contain historic properties.

Stipulation IX
Notices To Proceed With Construction

A Notices to Proceed (NTP) may be issued by the Corps for individual construction segments, defined by the Corps in its construction specifications, under any of the following conditions:

1. the Corps and SHPO have determined that there are no historic properties within the APE for a particular construction segment; or

2. the Corps and SHPO have determined that there will be no adverse effects caused to historic properties within the APE for a particular construction segment; or

3. the Corps after consultation with the SHPO and interested persons has implemented an adequate treatment plan for the construction segment, and

(a) the fieldwork phase of the treatment option has been completed; and

(b) The Corps has accepted and approved a summary of the fieldwork performed and a reporting schedule for that work.

Stipulation X
Unanticipated Discovery of Historic Properties

If historic properties potentially eligible for the NRHP are discovered during construction, the Corps shall cease ground disturbing activities until it has satisfied the provisions of 36 CFR §800.13(b), "discoveries without prior planning". The Corps shall provide the SHPO and the ACHP an opportunity to review and comment on proposed treatment in accordance with Stipulation VII. The Corps shall contact the SHPO within 48 hours of the discovery. The SHPO has 48 hours to respond following initial contact by the Corps.

Stipulation XI
Curation

The Corps shall ensure that all cultural materials and associated records resulting from identification, evaluation, and treatment efforts conducted under this PA are curated in accordance with 36 CFR Part 79, except as specified in Stipulation XII. Archaeological items and materials from privately owned lands to be returned to their owners should be maintained in accordance with 36 CFR Part 79 until any specified analyses are complete.

Stipulation XII
Native American Consultation and Treatment of Human Remains

A. The Corps shall ensure that the Indian groups identified above are invited to participate in the development and implementation of the terms of this PA. The specific manner in which this Native American involvement will occur shall be set forth in the HPTPs.

B. The Corps shall ensure that Native American human remains, grave goods, items of cultural patrimony, and sacred objects encountered during the undertaking that are located on state or private land are treated in accordance with the requirements California State Health and Safety Code, Section 7050.5, NRS 383.

C. The Corps shall ensure that Native American human remains, grave goods, items of cultural patrimony, and sacred objects encountered during the undertaking that are located on federal or tribal land are treated in accordance with the requirements of the requirements California State Health and Safety Code, Section 7050.5, NRS 383, and the Native American Graves Protection and Repatriation Act of 1990, as amended.

Stipulation XIII
Dispute Resolution

A. Should any signatory to this PA object within 15 calendar days to plans provided for review pursuant to this PA or to actions proposed or carried out pursuant to this PA, not including determinations of NRHP eligibility (see Stipulation III [J]), the Corps shall notify the SHPO and consult to resolve the objection. If the Corps determines that the objection cannot be resolved, the Corps shall forward all documentation relevant to the dispute to the ACHP. Within 45 days after receipt of all pertinent documentation, the ACHP shall either:

1. Provide the Corps with recommendations that the Corps shall take into account in reaching the final decision regarding the dispute; or

2. Notify the Corps that it will comment pursuant to 36 CFR §800.7, and proceed to comment. Any ACHP comment provided in response to such a request shall be taken into account by the Corps in accordance with 36 CFR §800.7 with reference to the subject of the dispute.

B. Any recommendation or comment provided by the ACHP will be understood to pertain only to the subject of the dispute. The Corps's responsibility to carry out all actions required by this PA that are not subject of the dispute shall remain unchanged.

Stipulation XIV
Amendments, Noncompliance, and Termination

A. If any signatory believes that the terms of this PA cannot be carried out or are not being met, or that an amendment to its terms should be made, that signatory shall immediately consult with the other signatories to consider and develop amendments to this PA pursuant to 36 CFR §800.6(c)(7)

B If this PA is not amended as provided for in this stipulation, the Corps, or the SHPO may terminate it. The party terminating the PA shall in writing provide all other signatories with an explanation of the reasons for termination in accordance with §800.6(c)(8).

C. If this PA is terminated and the Corps determines that the undertaking authorizing the project will proceed, the Corps shall comply with 36 CFR §800.3-800.6.

Stipulation XV
Duration of the PA

A. Five years after the execution of the PA, the signatories shall meet to discuss project progress and efficacy of the PA. Signatories will have the option to implement modifications or revisions to the PA at this point.

B. If the project has not been implemented within ten (10) years of the date of execution of the PA and the PA has not been terminated, the signatories shall consult on a date not less than 90 days prior to the tenth anniversary of the execution of this PA to reconsider its terms. Reconsideration may include continuation of the PA as originally executed, amendment, or termination. If the PA is terminated because the undertaking no longer meets the definition of an "undertaking" set forth in 36 CFR §800.16(y), Stipulation XIV (C) shall apply.

C. This PA shall be in effect through the Corps's implementation of the undertaking, and shall terminate and have no further force or effect when the Corps, in consultation with the SHPO, determines that the terms of this PA have been fulfilled in a satisfactory manner and/or Corps involvement in the project has ended. The Corps shall provide the other signatories with written notice of its determination and of termination of this PA.

Stipulation XVI
Effective Date

This PA shall take effect on the date that it has been fully executed by the Corps and the SHPO.

EXECUTION of this PA by the Corps, the SHPO, and the ACHP, and its transmittal to the ACHP, and subsequent implementation of its terms evidence that the Corps has afforded the ACHP an opportunity to comment on the undertaking and its effects on historic properties, that the Corps shall take into account the effects of the undertaking on historic properties, and that the Corps has satisfied its responsibilities under Section 106 of the National Historic Preservation Act and applicable implementing regulations for all aspects of the undertaking.

SIGNATORIES:

U.S. ARMY CORPS OF ENGINEERS, SACRAMENTO DISTRICT

BY: _____ DATE: 30 APRIL 2012

William J. Leady, P.E., Colonel, U.S. Army Corps of Engineers, District Commander

CALIFORNIA STATE HISTORIC PRESERVATION OFFICE

BY: _____ DATE: 6/8/12

for Milford Wayne Donaldson, FAIA, State Historic Preservation Officer

CONCURRING PARTIES:

SUTTER BUTTE FLOOD CONTROL AGENCY

BY: _____ DATE: _____

TITLE:

STATE OF CALIFORNIA DEPARTMENT OF WATER RESOURCES, ACTING BY AND THROUGH THE CENTRAL VALLEY FLOOD PROTECTION BOARD

BY: _____ DATE: _____

TITLE:

MECHOOPDA INDIAN TRIBE OF CHICO RANCHERIA

BY: _____ DATE: _____

TITLE:

UNITED AUBURN INDIAN COMMUNITY OF THE AUBURN RANCHERIA

BY: _____ DATE: _____

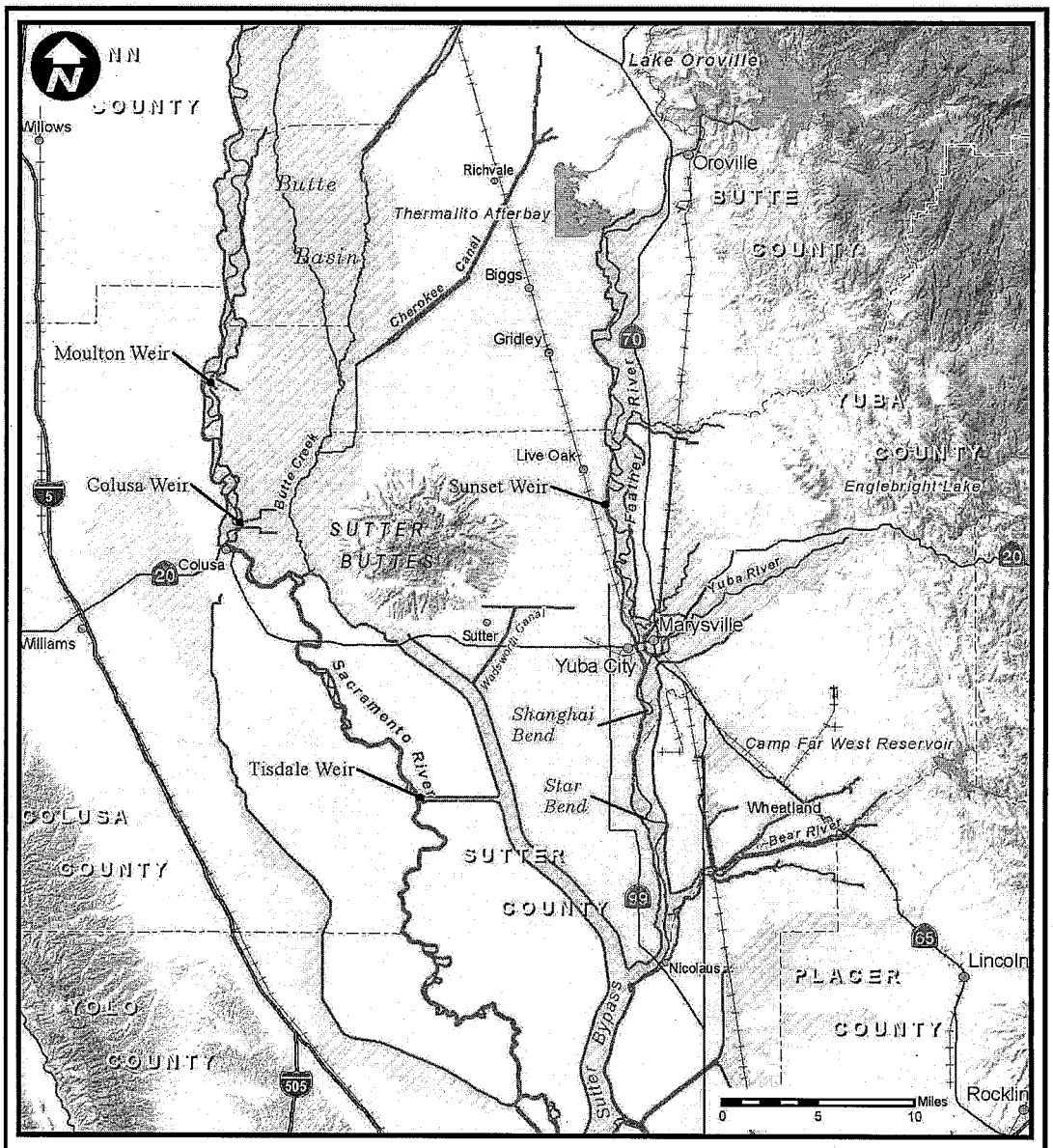
TITLE:

ESTOM YUMEKA MAIDU TRIBE OF ENTERPRISE RANCHERIA

BY: _____ DATE: _____

TITLE:

Appendix 1
Study Area Map



Legend

- City or Town
- County Boundary
- Freeway
- Highway
- Railroad
- River or Stream
- Federal Levee
- Study Area Extent
- Lake or Reservoir
- Designated Floodways

SUTTER BASIN PILOT STUDY
SUTTER BASIN, CALIFORNIA

STUDY AREA

U.S. ARMY CORPS OF ENGINEERS
SACRAMENTO DISTRICT

Prepared by Jim Mars

FEB 2012

Appendix 2
Standards and Guidelines for Research Designs

Research designs prepared for this undertaking shall specify, at a minimum:

- The property, or properties, or portions of properties where data recovery is to be carried out;
- Any property, or properties or portions of properties that will be destroyed with data recovery;
- The research questions to be addressed through the data recovery, with an explanation of their relevance and importance;
- The methods to be used, with an explanation of their relevance to the research questions;
- The methods to be used in analysis, data management, and dissemination of data, including a schedule;
- The proposed disposition of recovered materials and records;
- Proposed methods by which the parties to the Programmatic Agreement will be kept informed of the work and afforded the opportunity to participate; and
- A proposed schedule for the submission of progress reports to the California State Historic Preservation Officer.

Appendix 3
Historic Property Treatment Plans (HPTP) shall address:

- The historic properties or portions of historic properties where treatment will be implemented;
- Any historic properties or portions of historic properties that will be destroyed or altered without treatment;
- If the property or properties are eligible under criteria (a), (b), or (c), a mitigation plan other than data recovery may be considered. These may include, but are not limited to HABS/HAER recordation, oral history, historic markers, exhibits, interpretive brochures or publications.
- If the property or properties are eligible under criterion (d), a research design including the research questions and goals that the data recovery on a property could inform, an explanation of the theoretical and substantive relevance and importance of the proposed research, and specifically how the proposed actions will inform those questions and goals;
- The field and analysis methods to be used, with an explanation of their relevance to the goals of the mitigation;
- The methods to be used in data management and dissemination of data, including a schedule;
- The proposed disposition of recovered materials and records;
- Proposed methods for disseminating results of work to cultural resources professionals and separately to the interested public;

- Proposed methods by which appropriate Native American groups and individuals, local governments, and other interested persons will be kept informed about implementation of the HPTP and afforded an opportunity to comment;

- A proposed schedule for submission of progress reports to the Corps, SHPO, and the Council;

- Methods and procedures for the recovery, analysis, treatment, and disposition of human remains, associated grave goods, and objects of cultural patrimony that reflect any concerns and/or conditions identified as a result of consultations between the Corps and any affected Native American Group (see Stipulation XII);

- Qualifications of consultants employed to undertake the implementation of the STP, meeting at minimum those standards described in Stipulation I.

Avoidance of adverse effects on historic properties is the preferred treatment approach. The HPTP will discuss and justify the chosen approaches to the treatment of project historic properties and those treatment options considered, but rejected. If preservation of part or all of any historic properties is proposed, the treatment plan will include discussion of the following:

1. Description of the area or portions of the historic properties to be preserved in-place, and an explanation of why those areas or portions of sites were chosen;
2. Explanation of how the historic properties will be preserved in-place, including both legal and physical mechanism for such preservation;
3. A plan for monitoring and assessing the effectiveness of mechanisms to preserve the historic properties; and
4. A plan for minimizing or mitigating future adverse effects on the historic properties if preservation in-place mechanisms prove to be ineffective.